OCTOBER, 1956

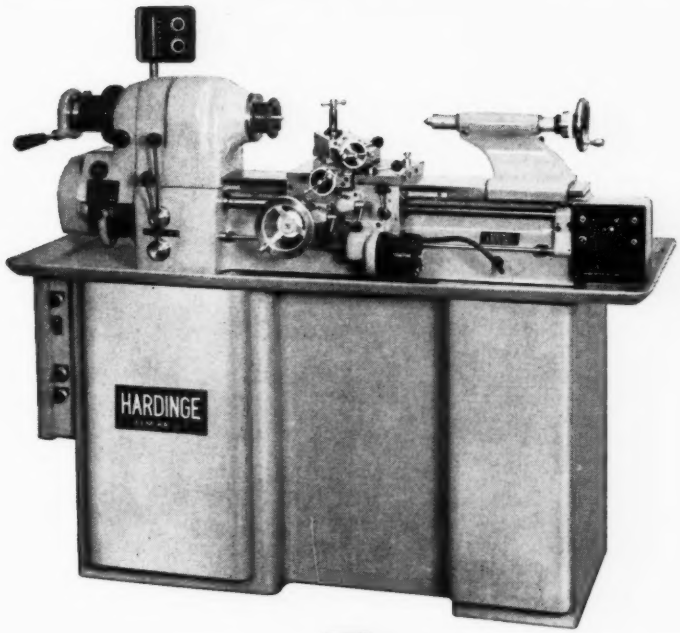
TOOLING and PRODUCTION

The Magazine of Manufacturing Management

Try These Pneumatic Circuits . . . p. 98 · Precision Barreling . . . p. 103
Less Press Setup Time . . . p. 85 · Gage Control . . . p. 202 · Die Design . . . p. 89
Complete Editorial Index . . . p. 78
New Products . . . p. 228 Shop Aids . . . p. 226 Helpful Literature . . . p. 178

HARDINGE
ELMIRA, N.Y.

OUTSTANDING FOR PRECISION PERFORMANCE



HARDINGE HLV
TOOL ROOM LATHE

Push Button Control for Infinitely Variable Spindle Speeds
Extreme Lasting Accuracy
Thread Cutting Ability

True as the spindle—

Sutton collets and feeders

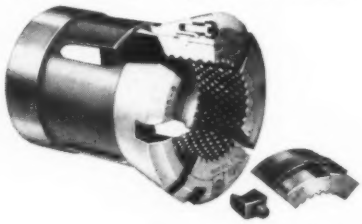
assure positive grip, resistance to wear, long life, low cost

Made from selected alloy and tool steels which experience has proved to be the best material for these tools. All manufacturing, from raw material through heat treat to finish grinding, is performed in Sutton's modern factory. Expert heat treating, under complete instrument control, provides maximum efficiency in spring temper and feeder tension, and reduces loss by breakage or loss of tension.

Sutton features

1. Diamond-Grip Serration 2. Cam Ground Collets 3. Ground and Milled Threads 4. Uniform spreading through controlled heating and special fixtures.

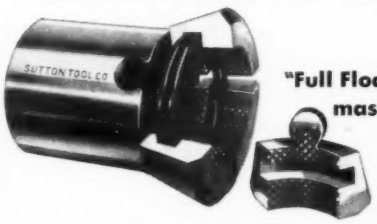
"Quick Change" master collets



Patented

Change pads without removing collets from machine. Holding screws inserted into collet to prevent loosening of pads. Clamp has compensating spring effect to absorb shock in restocking operation. Reduces collet inventory.

FULL BEARING ON HOT ROLLED STOCK

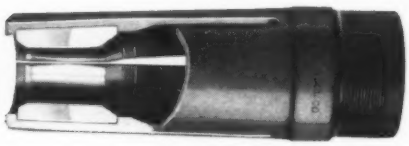


"Full Floating" Style "F" master collets

Patented

Handles hot rolled stock varying from .010" to .040", and still provides accurate gripping. Easily changeable jaws float independently and come to a full bearing on the stock. Prevents slippage. Lowers power demand.

Popular Sizes of Standard Type Collets and Feeders Carried in Stock for Immediate Delivery!



Style "L" Master Feeders

Interchangeable and replaceable pads seated in recess, with lug engaging a slot in the master to keep pads from rotating. No pins or screws. Style "L"s handle stock practically up to machine capacity, and full range of machine.

Super Feeders

Multiple grip becomes a spring in compression. Gripping pressure exerted directly and uniformly. Large area of contact. Handles round, hexagon or square stock. Available in non-marring bronze.

CUSTOMER SERVICE

Every order received is carefully indexed on a customer's record to assure exact duplication on repeat orders. These records are continuous from the day SUTTON started in business.

IMPORTANT NOTES TO COLLET BUYERS!

"Diamond Grip" Serrations

Diamond-grip serrations are provided by special equipment designed solely for that purpose and perfected in our plant. Diamond-grip serrations give these added advantages:

1. Grip work tighter. Attack horizontal and rotating thrusts at an angle.
2. Reduce spoilage by preventing slippage.
3. Prolong life of chucking mechanism by gripping tightly under reduced tension.
4. Clear themselves of dirt, scale and chips.

Special Collets

SUTTON specializes in designing, engineering and manufacturing of special collets and other holding fixtures. No collet is too small, or too large for SUTTON'S technical knowledge and facilities to manufacture.

Standard Collets and Feeders

Acme Gridley, Browne & Sharpe, Cone, Davenport, Greenlee, New Britain Gridley and Warner & Swasey Automatics. Turret lathe Collets and Pads, precision made Collets for toolroom lathes, millers and grinders.

Get sudden service with Sutton Collets!

Write For Catalog →

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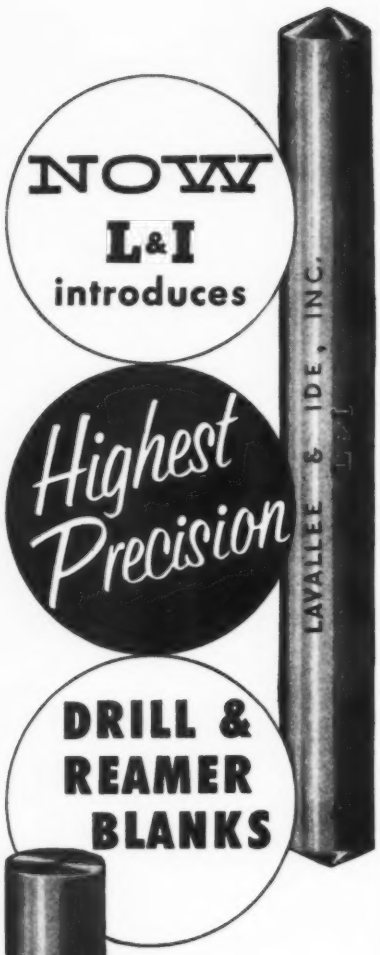

CIRCLE INFORM-A-GRAM KEY NO. 4

TOOLING and PRODUCTION

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VOL. XXII—No. 7
OCTOBER 1956

GEORGE J. HUEBNER, Founder

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Editorial ..... Page 82

TOOLING and PRODUCTION'S great appeal is to those men who operate the plants and divisions of industry, their production departments and their toolrooms. It is they who collectively are charged with the responsibility of manufacturing their companies' products precisely, efficiently and profitably.

They have the influence that enables them to adopt the ideas and the processes which TOOLING and PRODUCTION describes in every issue AND the authority to recommend, to specify and/or to buy everything that may be needed to reduce costs, increase production or improve quality. These men for whom, each month our editors seek out or write TOOLING and PRODUCTION'S meticulously accurate stories of "Know-How" and "Tell-How" are T & P's exclusive Cycle of Buying Influence (CBI) in their plants.

Every copy is directed to these men by name, by title and by company address. Please see our BPA verification.

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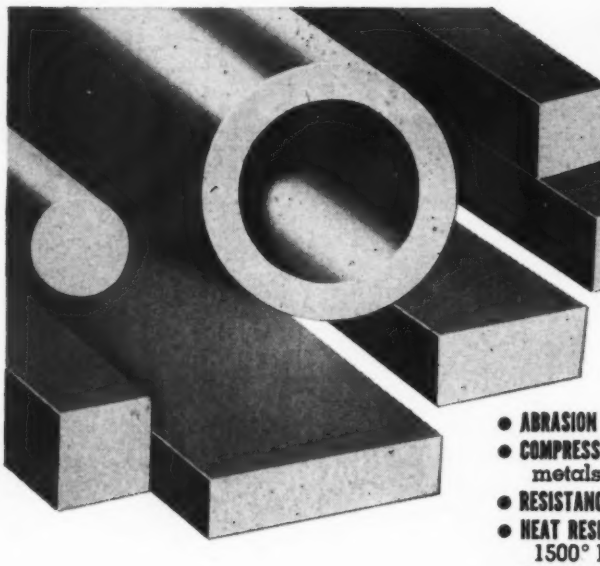

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TALIDE METAL, a tungsten carbide of superior quality, is harder, stronger, and more resistant to abrasion than any other metal. Properly applied, it gives superior service on applications where wear, heat, strain and shock are destructive to other metals.

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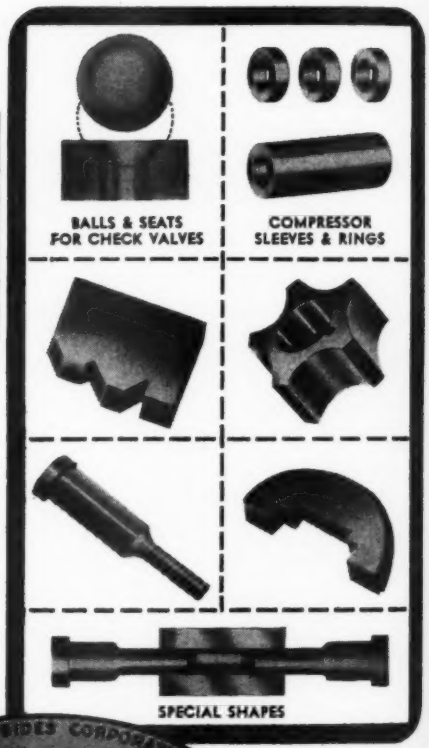
TALIDE METAL is saving industry millions of dollars annually by wear-proofing vital parts on machine tools, presses, pumps, compressors and other types of processing equipment used in the steel, oil, chemical, plastic, auto, rubber, textile, glass, mining and metal-working industry. The physical properties of the most commonly used grades are listed below. Other grades are available for specialized applications.

PHYSICAL PROPERTIES OF TALIDE METAL (P. S. I.)

Application	Operation	Talide Grade	Rockwell "A" Hardness	Specific Gravity (Density)	Transverse Rupture Strength	Compressive Strength	Co-Efficient of Thermal Expansion	Modulus of Elasticity (Deflection)
WEAR SURFACE	No Shock	C-91	91.8	14.90	235,000	710,000	3.00x10-6	91,000,000
	Light Shock	C-99	91.0	14.75	265,000	670,000	3.65x10-6	84,000,000
	Medium Shock	C-88	89.5	14.55	295,000	635,000	4.00x10-6	80,000,000
IMPACT	Light	C-85	88.4	14.25	315,000	600,000	3.75x10-6	77,000,000
	Medium	C-80	87.0	13.85	335,000	550,000	4.50x10-6	74,000,000
	Heavy	C-75	85.0	13.15	355,000	500,000	5.00x10-6	70,000,000

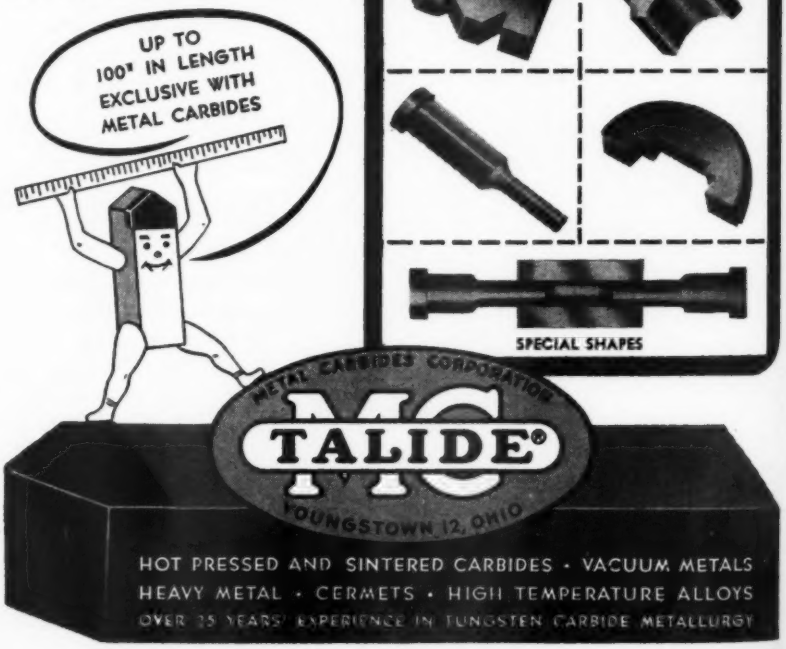
Note: Hardness values may vary plus or minus .2 to .3 on individual lots.



All TALIDE METAL grades are made in latest type vacuum electric furnaces by precision methods under rigid control. A wide variety of shapes and sizes can be supplied—up to 25" in diameter, 100" in length, and 5000 pounds by weight. Parts can be supplied to any grit finish required down to one micro-inch.

Metal Carbides Corporation,
Youngstown 12, Ohio.

Send for new 76-page catalog 56-G or ask for sales engineer to call.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CIRCLE INFORM-A-GRAM KEY NO. 6

BALAS solid carbide PUSHER PADS

RELATIVELY INEXPENSIVE!

Examples of prices for popular machines:

ACME-GRIDLEY		BROWN & SHARPE	
9/16"	$11.50	#00	$ 8.75
1"	17.00	#10	10.75
1¼"	24.00	#11A	11.95

CONE		DAVENPORT	
1"	$17.00	Std. 9/16"	$11.95
1¼"	24.00	Oversize ¾"	13.75
1⅝"	27.00		

NEW BRITAIN-GRIDLEY	
1"	$17.00
1¼"	24.00
1⅝"	27.00

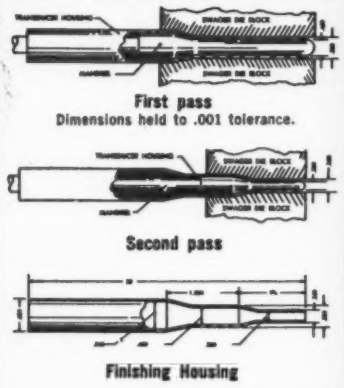
Write for folder giving complete details and prices on Balas Carbide Pusher Pads and Model "A" Master Pushers.

BALAS COLLET MANUFACTURING CO.
CLEVELAND 14, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 7

ARE YOU MACHINING **when you should be SWAGING?**

SWAGING TRANSDUCER HOUSING



First pass
Dimensions held to .001 tolerance.

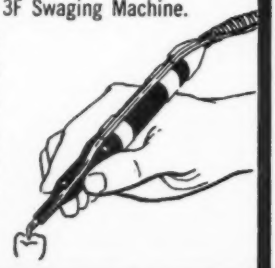
Second pass

Finishing Housing

How SWAGING cuts costs 80% on Transducer Housing

The Cavitron Ultrasonic Dental Unit provides a marvelous new method for preparing cavities without noise, vibration and heat which contribute so greatly to dental pain and discomfort. Internal dimensions of the transducer housing are critical. A mating cap requires the outside diameter to be rigidly held as well. This housing was formerly machined in two parts and silver brazed together. Now, it is made in one piece from tube stock in 2 passes on a Fenn Model 3F Swaging Machine.

RESULT — Cavitron has not only reduced cost of the Transducer Housing 75% to 80% but now has a simplified one-piece housing that is stronger, easier to make and with a smooth, bright surface resulting from swaging which requires no additional finishing. Write for catalog and full information.



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CIRCLE INFORM-A-GRAM KEY NO. 8

★ ★ ★ ★ ★ ★ ★ ★

Talk of the Month

★ ★ ★ ★ ★ ★ ★ ★

SOME MECHANIZATION PROBLEMS FOR MANAGEMENT*

by James R. Bright

Lecturer in Industrial Management
Graduate School of Business Administration
Harvard University

DURING THE PAST TWO YEARS, I have visited about 15 highly automatic plants and studied them in some detail. My remarks, therefore, are a projection of what I've seen there, but by no means a proof that these things have happened everywhere. On the other hand, they represent something more than hypothesis. Now these so-called automatic plants are very remarkable technical accomplishments. Yet my first point is that the public has been oversold.

They are not nearly as automatic as people have claimed.

I still feel like the jet pilot visiting a group of control engineers at an electrical manufacturing plant who thought they'd have a little fun with him. They said, "We want you to look at this new servomechanism for flight control of a jet plane. We've got this thing down to a highly automatic state and, in just a few more years, boy, you're going to be out of a job. We're going to run this plane from the ground."

The pilot laughed — "Frankly, I'm not too worried. I don't think you fellows are quite as smart as you make out. Have you been able to come up with a control mechanism that has six degrees of freedom, a sense of sight, smell, sound, taste, and touch, that weighs less than 150 pounds, is completely self-contained, self-preparing, even self-lubricating? Not only that, have you come up with anything so readily and easily reproduced by inexperienced labor?"

Maybe there is hope for us in spite of the Cypak engineers!

. . . *Continued on Page 18*

*Presented at the 20th Annual Machine Tool Electrification Forum; Sponsored by the Westinghouse Electric Corporation.

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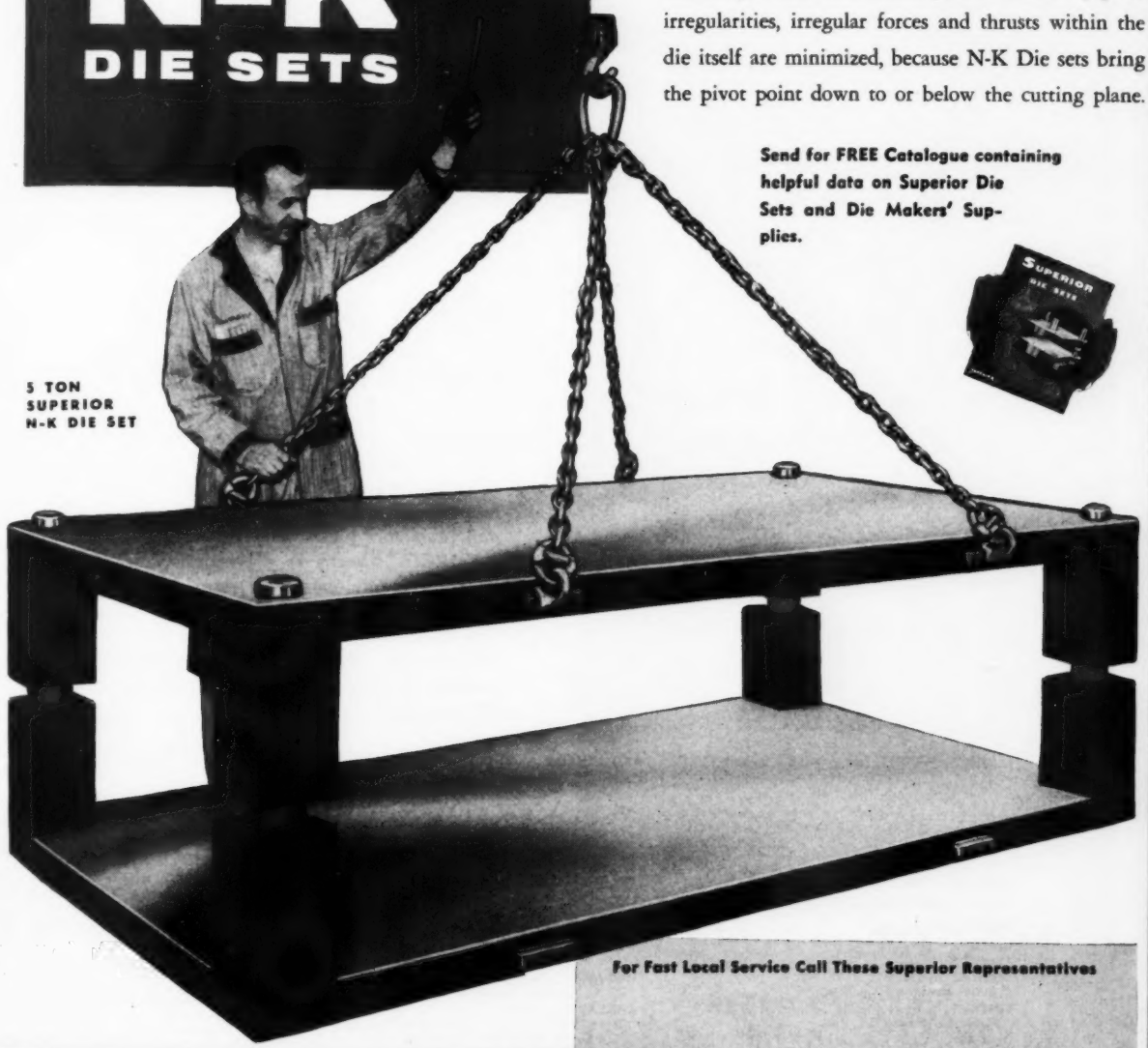

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Now you can equip your geared pneumatic clutch presses with V & O Feed-O-Matics and gain all the advantages of precision automatic feeding — increased production, greater personnel safety, and precision quality control. The Feed-O-Matic for geared presses is driven directly from the drive shaft on a one-to-one ratio. Mechanical "fingers" of the Feed-O-Matic lift parts up, over and into the die for precise placement. High cost tools can be used with less fear of breakage and stop motions are eliminated. Write today for complete information.

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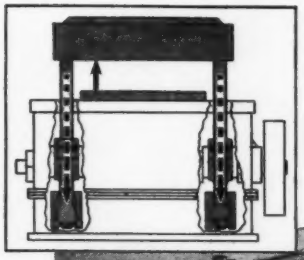
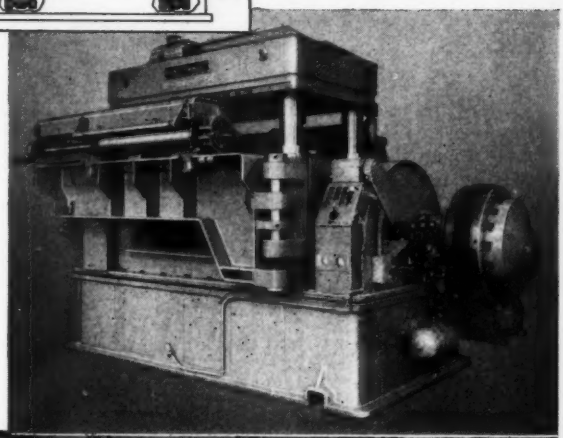
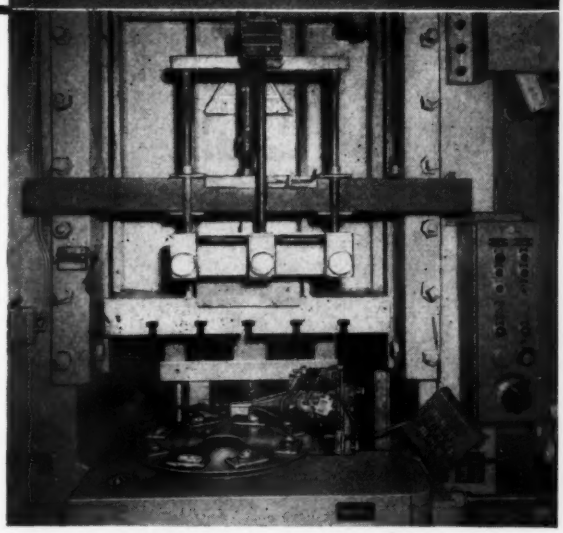


New 350-Ton Dieing Machine. Insert drawing shows advantages of new Double-Crank assembly.

(1) Completely enclosed to prevent chips, slugs, stock lubricating compound and other foreign matter from entering and damaging working parts; (2) A self contained recirculating lubrication system; (3) Large area chutes at front and rear for disposal of finished parts, scrap slugs and installation of stackers; (4) Swing-out type roll feed, solidly supported on knees when in operation; (5) Roll feed driving mechanism completely enclosed; and (6) Crosshead adjusting mechanism is conveniently located within the upper crosshead for easy accessibility. Write today for complete details.





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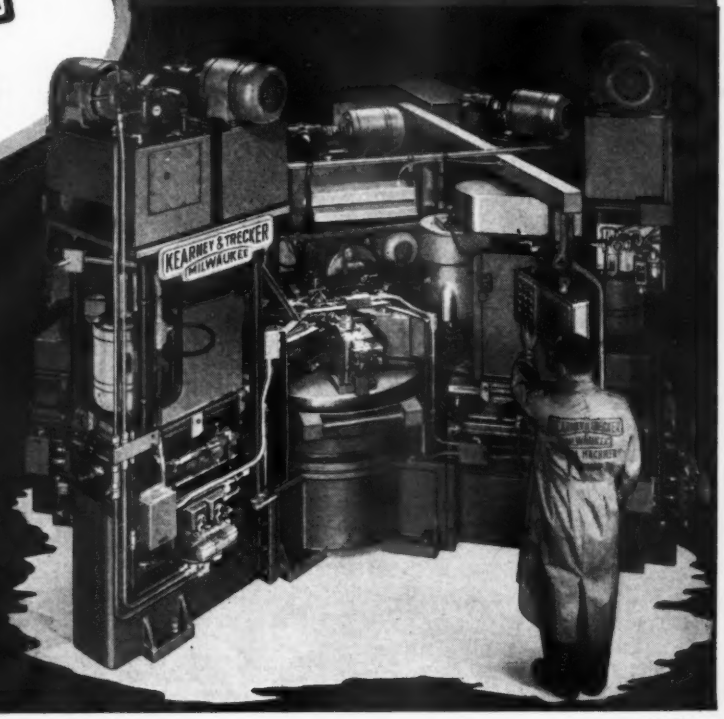
KEARNEY & TRECKER MILWAUKEE® DESIGNED

Here's Kearney & Trecker's answer: Two 6-Station Rotary Indexing machines which mill 24 surfaces on cast iron telephone relay frames within plus or minus .002" at a combined rate of 360 pieces per hour. Former methods produced only 150 relay frames per hour.

An important cost-saving feature of each machine is the application of standard units — five feed slides and a 48" rotary index table. Such utilization of standard units lowered initial costs, simplified maintenance and increased efficiency.

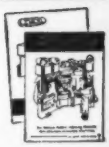


High-volume, low-cost production starts with Kearney & Trecker Milwaukee machine tools

Kearney & Trecker automatic production machines accurately perform many operations at lower cost. But most important to you, this is accomplished by combining standard design components — feed slides, way-type drill units, tapping units, quill feed units, rotary index tables — that keep initial machine costs at a minimum. You get the production you want and the economies you need from job-proven designs. What's more, you get performance to exacting accuracies.

Take advantage of our abilities. See how they can pay off in new profits for you. Whatever your production machine needs, call our representative or write: Special Machinery Division, Kearney & Trecker Corp., 6776 W. National Ave., Milwaukee 14, Wisconsin.

For more information on machine illustrated, ask for Data Sheet No. 1083. A new bulletin, SMD-56, which describes many of our outstanding machine designs, is also yours for the asking.



Designers and Builders of Precision and Production Machine Tools Since 1898

CIRCLE INFORM-A-GRAM KEY NO. 12

SPECIAL RETAINER PLATES...

Punch Answers for Piercing Problems

On many punching operations, close center to center hole spacing in work and extremely fine tolerances must be held. R-B makes special retainer plates that will hold punches and die buttons exactly to your spacing specifications.

Any shape, size or number of punches and die buttons can be incorporated in the designing of your special R-B retainer plates. Also, ball locks are built into each special retainer to provide the same quick radial and vertical locking of punches and die buttons found in standard R-B retainers.

Special R-B retainer plates are made of tool steel which is precision ground after hardening. You will save skilled man hours in die construction and maintenance by using these multiple hole retainer plates. Result—more work completed each day and increased profits for you.

Use R-B Engineering Service for your Piercing Problems

For Additional Information or Engineering Service, Write to:

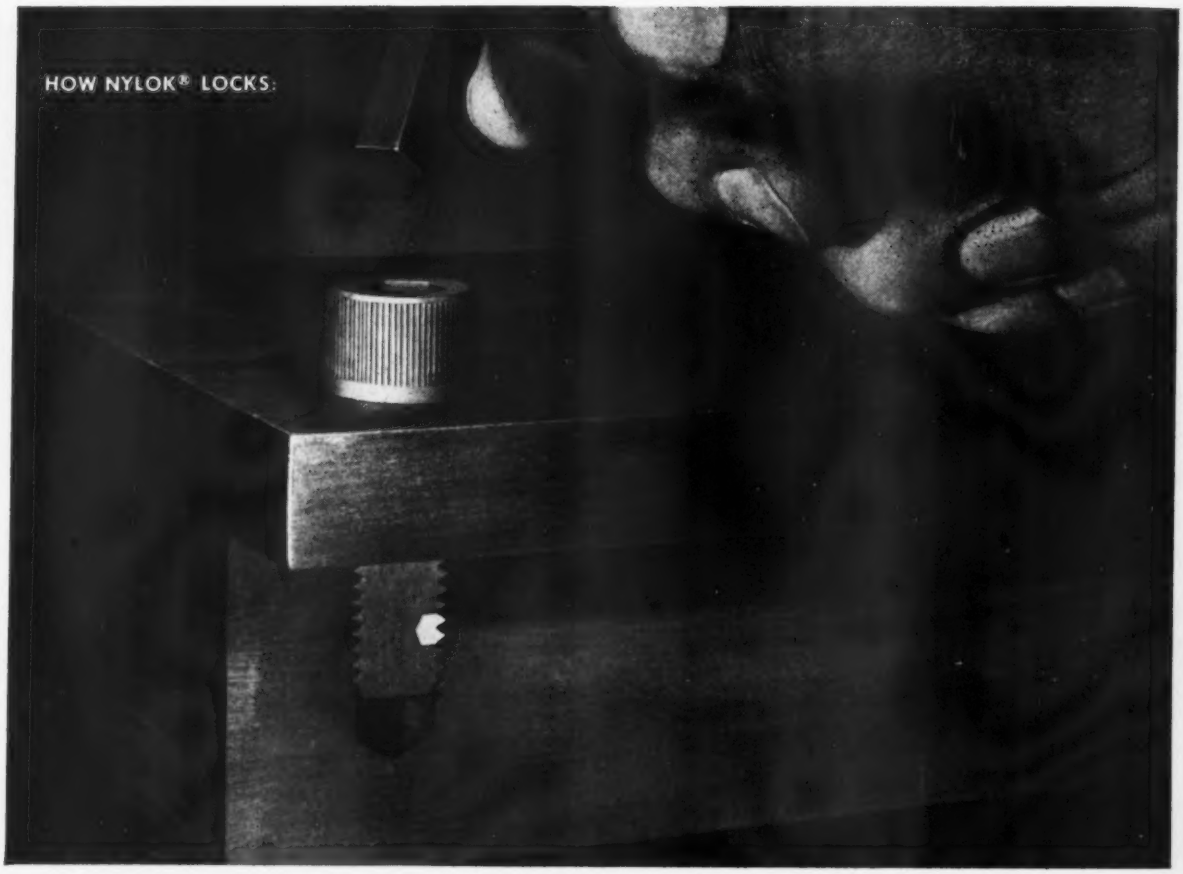
RICHARD BROTHERS PUNCH DIVISION

ALLIED PRODUCTS CORPORATION

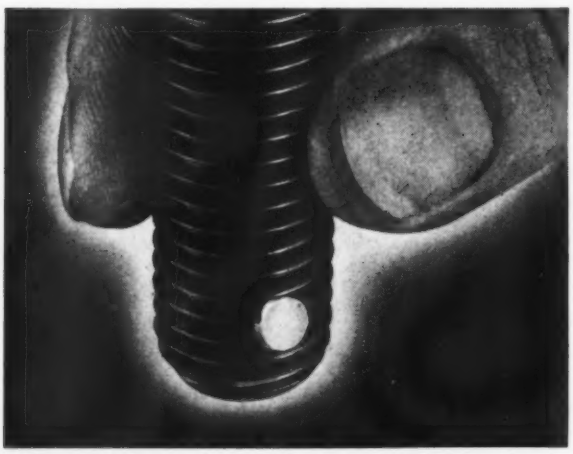
DEPT. 21 • 26476 CAPITOL AVENUE • DETROIT 39, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 13

NEW—a complete line of socket screw products



LOCKED! The tough, resilient nylon pellet keys itself into the mating threads. It forces threads together, and locks the screw securely.



BEFORE ASSEMBLY. The nylon pellet projects slightly beyond male threads. When assembled, female threads will be impressed into it. Pellet locks effectively whether the screw is seated or not.

AFTER REMOVAL. "Plastic memory" of pellet has expanded impressed threads to greater diameter than screw threads. Screw can be used repeatedly. In use, "memory" keeps threads tightly locked.

self-locking UNBRAKO that won't work loose

They simplify design and save production time

UNBRAKO socket screws are now available embodying the Nylok* self-locking principle. Nylok provides a truly practical new solution to the problem of making screws self-locking.

An UNBRAKO screw with Nylok is a single self-locking unit. No auxiliary locking devices are needed. Just thread the UNBRAKO into any tapped hole. *Seated or not*, it locks positively wherever wrenching stops. The tough, resilient nylon pellet forces mating threads together and holds tight. The screw will not shake loose.

You save production time when you build products with self-locking UNBRAKOS. And you get greater simplicity in design with less bulk and weight. The number of parts you must assemble to achieve full locking action is reduced to the absolute minimum. Lockwashers under screw heads are no longer necessary. Costly wiring of cross drilled heads is eliminated. So are cotter pins and complex multiple set screw installations.

Self-locking UNBRAKOS are completely reusable. They have uniform locking and installation torques—with no galling or seizing on mating threads. They successfully withstand temperatures from —70° to 250°F. And, on properly seated screws, the pellet acts as a liquid seal.

Self-locking UNBRAKO socket screws come in a complete range of standard sizes and materials. See your authorized industrial distributor. Technical data and specifications are detailed in Bulletin 2193. Write us for your copy today. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 36, Pa.

T.M. Reg. U.S. Pat. Off., The Nylok Corporation

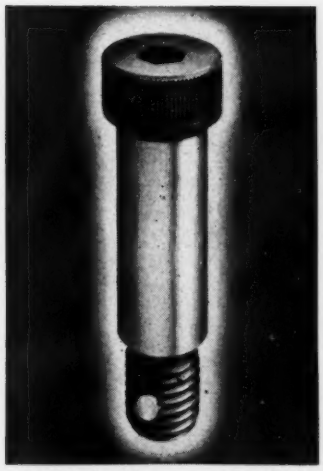
UNBRAKO SOCKET SCREW DIVISION

STANDARD PRESSED STEEL CO.

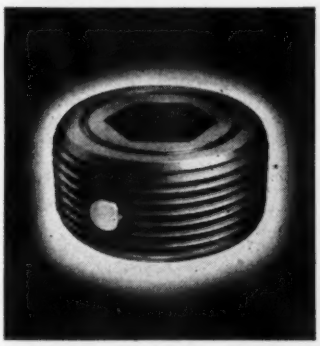
SPS

JENKINTOWN PENNSYLVANIA

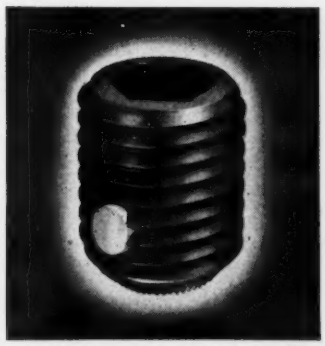
Socket head cap screws. Standard sizes #6 to 1 in.



Socket shoulder screws. Standard sizes ¼ to ¾ in.

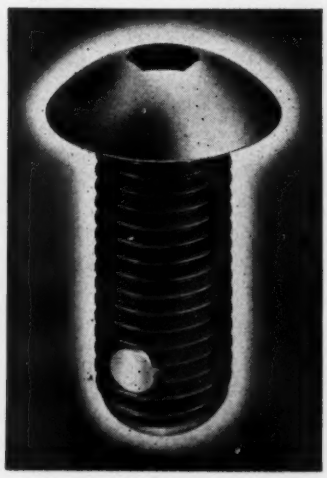


Socket pressure plugs. Standard sizes ⅛ to 1¼ in.



Socket set screws. All standard point types. Standard sizes #6 to 1 in.

Flat head socket screws. Standard sizes #6 to ¾ in.

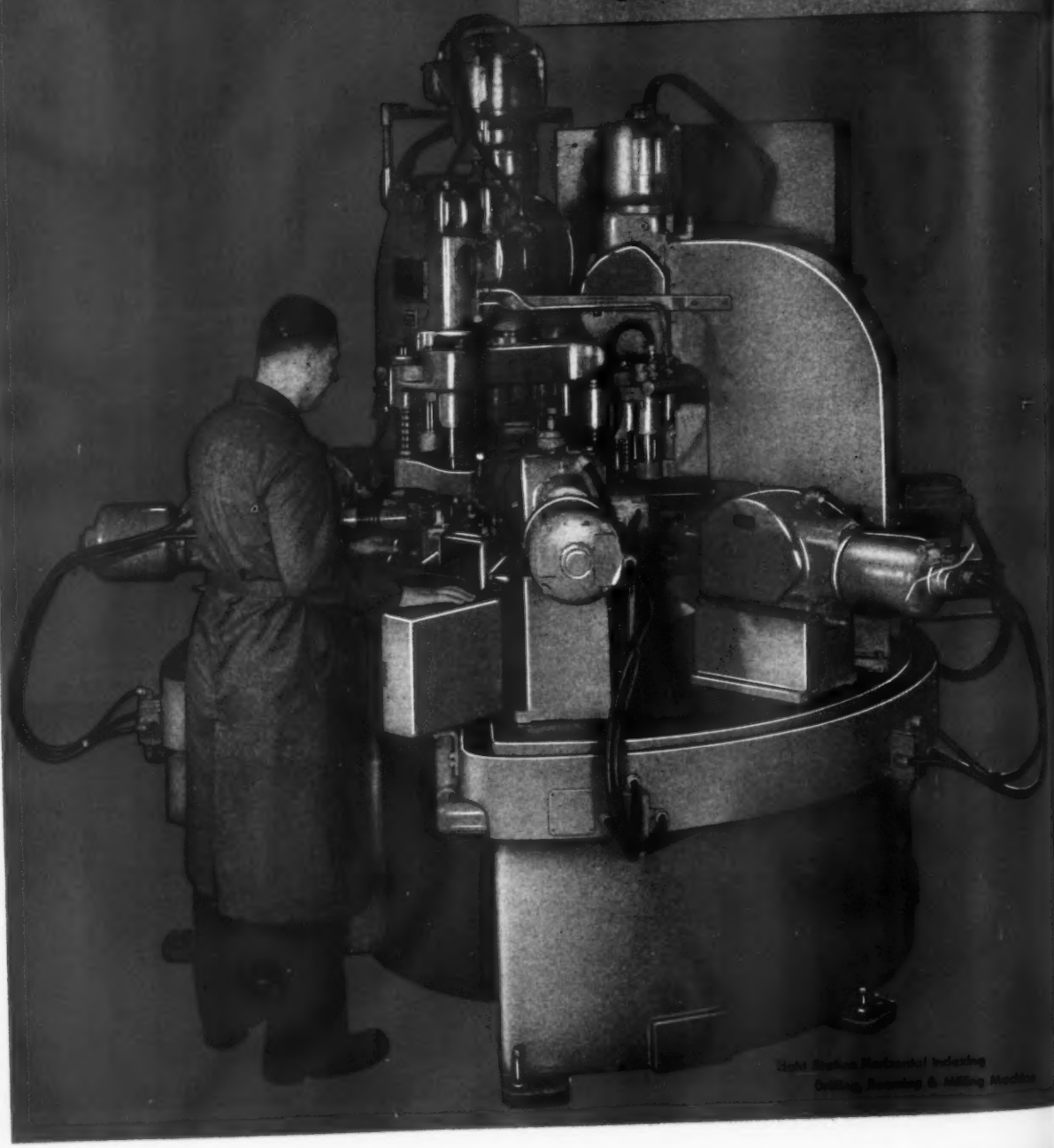


Button head socket screws. Standard sizes #6 to ⅜ in.

CIRCLE INFORM-A-GRAM KEY NO. 15

HARTFORD *Special*

OFFERS
better products
at lower cost
thru better methods

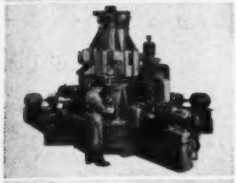


Eight Station Horizontal Indexing
Drilling, Reaming & Milling Machine

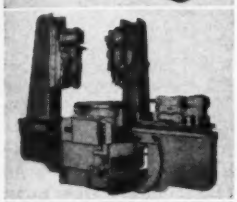
ONE SOURCE FOR BOTH

Automatic Production Machines

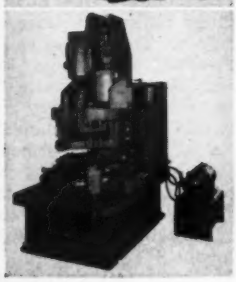
Double End Trunnion Type Machine



Center Column Indexing Type Machine

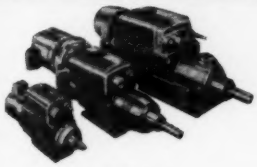


Universal Drilling Machine for jet aircraft components



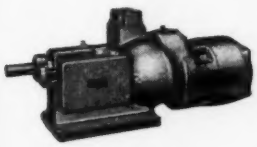
Vertical Single Unit Multiple Spindle Indexing Machine

Standard Machine Components

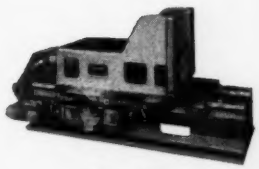


Quill Type Air Hydraulic Drill Units

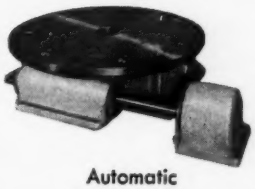
Quill Type Cam Units



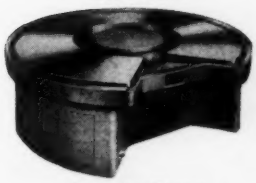
Quill Type Lead Screw Tapping Units



Way Type Hydraulic Feed Units



Automatic Index Tables Horizontal and Vertical



Machine Bases

Designing and building automatic production machines like those illustrated are a "Hartford" specialty. Years of experience have proven that dependable high production and economy can best be brought to the user by means of standard machine components.

Now Hartford Special offers these production tested components to users for machines of their own construction.

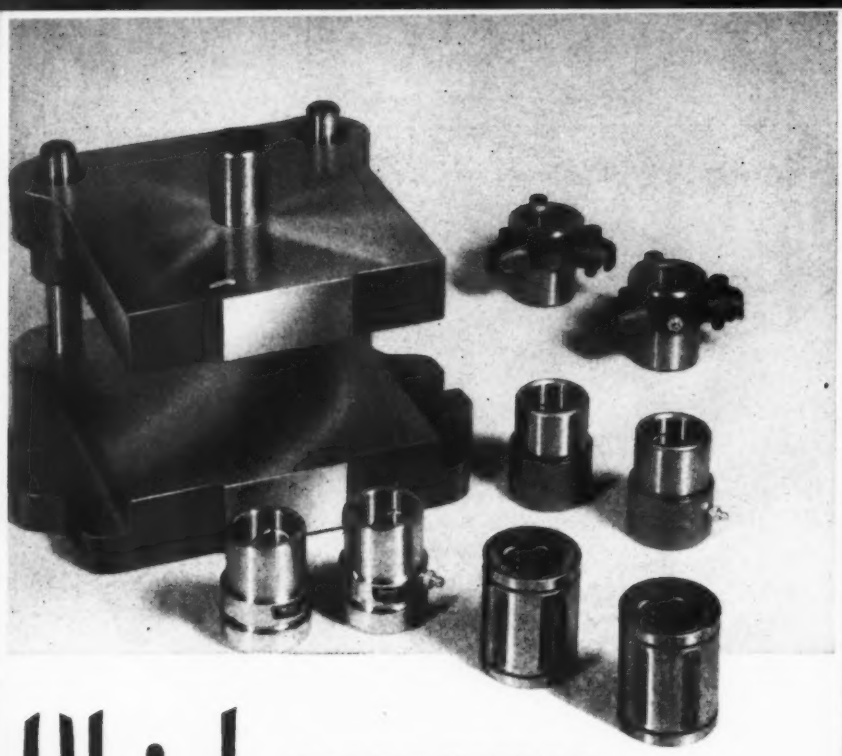
Consult Hartford engineers for either—completely tooled machines or components.

HARTFORD Special

MACHINE TOOL DIVISION
THE HARTFORD SPECIAL MACHINERY CO.
29210 HOMESTEAD AVE., HARTFORD 12, CONN.

Hartford also makes automatic Thread Rolling Machines, Special Machinery and the world famous Super-Spacer.

CIRCLE INFORM-A-GRAM KEY NO. 17



Which BUSHING SHOULD YOU USE?

Your choice is getting broader every day. Each of the guide pin bushings above is good—in the right application. But, some of them cost more than others. Which should you use for best results consistent with cost?

That's where Detroit Die Set can help you. In our 25 years of exclusively building die sets, we've tested a good many types of bushings. Based upon these tests and performance in our customers' plants, we stock and recommend a number of types of bushings for use in our die sets.

To aid you in bushing selection, we've prepared a bulletin on the subject. Just ask for Bulletin 56, and we'll send your personal copy without delay. Detroit Die Set representatives also will be glad to personally aid you in selecting the right bushings and die sets. They're as near as your 'phone.

Offices in Principal Industrial Centers

Detroit DIE SET CORPORATION

2895 WEST GRAND BOULEVARD • DETROIT 2, MICHIGAN

. . . Month's Talk, from Page 8

Time will not permit a complete discussion, so I shall try to condense these remarks around four characteristics of the highly automatic plant which many people do not appreciate.

First, Automaticity has an astounding way of restricting the source of supply.

Very few firms have appreciated this. In Pennsylvania an imaginative outfit has been trying to mine coal 1,000 feet underground by remote control. They used television cameras mounted on a continuous miner and self-propelled transportation system. Their idea was to guide this mechanism from outside the mine, thus doing practically manless mining. Their first problem was that the television set couldn't tell rock from coal; it was mining rock at a great rate at times. But the company was well on the way to licking it when they had to shift into another stratum of coal. That was the end. Why? There wasn't anything wrong with the machine, the fault was with the material. The stratum of coal was not strong enough to sustain the necessary 9 x 4½ foot opening without timbering, so the roof collapsed. So they pulled the machine out and tried another place. The same thing happened there. They tried several other places and finally gave up. There was no suitable coal in the area. The failure of automation was not a failure in mechanical concept — it was a failure of supply.

Now another example. A bakery started into automation by bringing in flour in hopper cars, then pumping it into storage tanks and, later, into the mixers, etc. The system was set up and it worked beautifully. They told their six suppliers about a year ahead of time that they were going to do this, and that they should be prepared to fill these special hopper cars. When the day came to order bulk shipments, only one of their suppliers was equipped to fill these bulk cars. In effect, the source of supply was cut five-sixths.

A far cry from metalworking, you say — that doesn't happen to us. Gentlemen, it certainly does! At General Mills, United Shoe, and Admiral one of the characteristics of their automatic inserting machines is that suddenly you have to go back to purchasing, back to suppliers, to put new emphasis on getting in parts that are absolutely perfect, absolutely uniform, and that can be handled by these machines. The machine doesn't make adjustments. The machine doesn't know that this is a washer with a quarter-inch hole and that the hole is a little bit off center. A person could put the washer on the bolt, but the machine won't. Not only does it have to be a one-fourth

. . . *Continued on Page 23*

Erickson Precision Expanding Mandrels Solve Grinding Problems

No. 2 of a Series

Photos: Courtesy The Timken Roller Bearing Company, Canton, Ohio

e.g. roller bearing races

Unusual accuracy is required in the manufacture of tapered-roller bearings. That's why The Timken Roller Bearing Company, leading producer of tapered-roller bearings, uses Erickson precision expanding mandrels for rough and finish grinding of roller bearing races. For in addition to their ability to hold to closest tolerances consistently, they have instantaneous release feature that speeds loading and unloading—for real production dividends.

Let an Erickson representative show you how Erickson precision expanding mandrels can solve your grinding problems. AA-2451

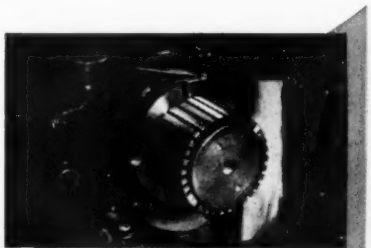
Collet Chucks
Floating Holders
Tap Chucks
Indexers

ERICKSON TOOL COMPANY

2301-10 Hamilton Avenue • Cleveland 14, Ohio

Tap Holders
Air-Operated Chucks
Expanding Mandrels
Special Holding Fixtures

Bothered by a tough internal holding problem? Then let us show you how Erickson mandrels speed production, lower grinding costs. Call us or write for Catalog K.

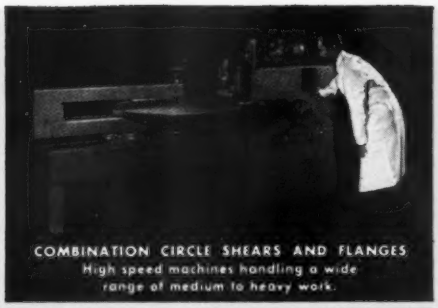


Closeup of Erickson precision expanding mandrel as used by Timken®. In special application illustrated, Erickson mandrels can hold one ten-thousandth of an inch (.0001") concentricity.

In plate or sheet metalworking...

NIAGARA MACHINES CAN D

PRESS BRAKES
50 - 775 ton capacities.



COMBINATION CIRCLE SHEARS AND FLANGES
High speed machines handling a wide range of medium to heavy work.

GAP FRAME DOUBLE CRANK PRESS
3 - 6½ inch shaft diameters.
48 - 222 ton capacities. Also, inclinable

BENDING ROLLS
Hand and power driven for a wide range of lengths and thicknesses.

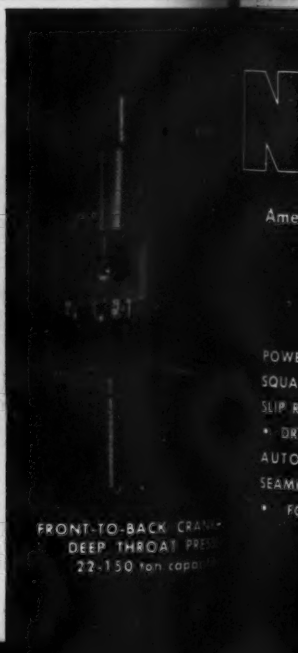
STRAIGHT SIDE DOUBLE CRANK PRESSES
50 - 300 ton capacities.

SINGLE CRANK OPEN BACK INCLINA
1¼ - 7½ inch shaft diameter
7 - 250 ton capacities.

TRAIGHT SIDE ECCENTRIC GEARED RESSES MODIFIED AND EQUIPPED FOR AUTOMATION
1, 2 and 4 point suspension.
100-1000 tons.

FRONT-TO-BACK CRANKSHAFT OPEN BACK INCLINABLE PRESSES
Standard and automation models.
75-200 tons.

FRONT-TO-BACK CRANKSHAFT ADJUSTABLE BED PRESSES
Standard and modified models.
22-150 tons.



FRONT-TO-BACK CRANK DEEP THROAT PRE
22-150 ton capa

N DO THE MOST* FOR YOU

STRAIGHT SIDE ECCENTRIC GEARED PRESSES
One, two and four-point suspension.
100 - 1000 ton capacities.

UNDERDRIVE POWER SQUARING SHEARS
Shim stock to 1 inch capacities in
lengths from 3 - 20 feet.

* MOST EXTENSIVE LINE:

From giant, power-operated machinery to small hand tools

* MOST ADVANCED DESIGNS:

Years ahead in performance through forward-thinking engineering

In the world's largest automotive and appliance plants or the smallest of sheet metal shops, Niagara machines and tools are usually at work "in force."

Batteries of giant presses are teamed up with speedy ring and circle shears. Massive, rugged press brakes stand side-by-side with powerful bending rolls and squaring shears. Versatile lever punches, rotary machines, groovers and seamers . . . all operate together to produce a better product at lower cost. The Niagara lines are "companion lines" of metalworking machines and tools that work together. A Niagara-equipped shop or plant is years ahead in quality and volume of production.

Whatever you require — power presses or hand tools — Niagara is the line that can do the most for you. It is the most complete in the industry . . . the most advanced in engineering. You can consult a Niagara representative with complete confidence of unbiased recommendations. Niagara has the right machines and tools for your requirements.

NIAGARA

America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

POWER PRESSES • PRESS BRAKES • POWER SQUARING SHEARS • ROTARY MACHINES • SLIP ROLL FORMERS • POWER ROTARY SHEARS • DRUM MAKING EQUIPMENT • ELECTRONIC AUTOMATIC WELDERS • GROOVERS AND SEAMERS • HAND OR FOOT OPERATED SHEARS • FOLDERS-BRAKES • LEVER SHEARS AND PUNCHES • HAND TOOLS

BRING YOUR FILES UP-TO-DATE WITH INFORMATIVE NIAGARA BULLETINS

A diversified and extensive list of machines and tools make up the famous Niagara line. Some of the principal types are illustrated. Be sure that you have the latest data on the ones that apply to your work. At your request, specific Bulletins will be mailed promptly.

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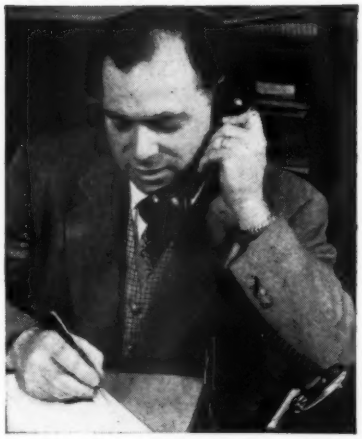
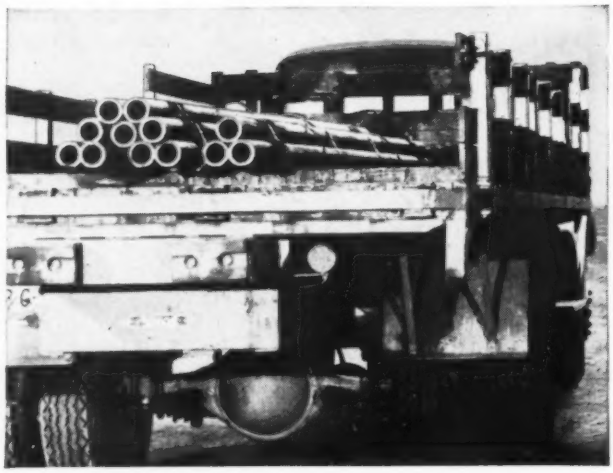
Your order of...

TIMKEN® 52100 steel tubing goes from here





...to here within 24 hours!

GOT a rush hollow parts job? Phone, wire or write the Timken Company. We'll ship you less-than-mill quantities of 52100 steel tubing from mill stock within 24 hours after receiving your order. It's the ideal steel for many of your hollow parts jobs.

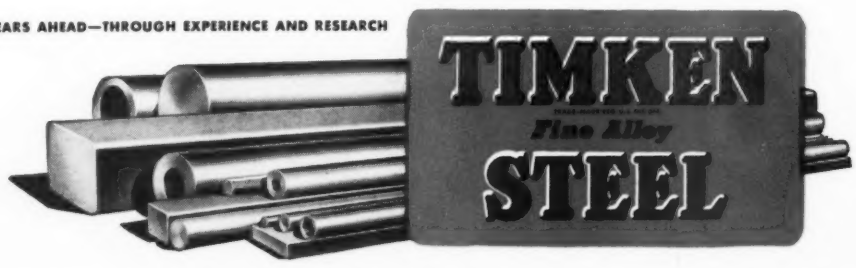
Besides saving you time, Timken® 52100 steel tubing can save you money. It can be substituted for more expensive steels. It's through-hardened in moderate sections and can be heat treated to file hardness and tempered back to any desired point.

Available in sizes from 1″ to 10½″, Timken 52100 steel is especially suited for hollow parts jobs like aircraft parts, ball bearing races, pump parts and plungers, collets, bushings, spindles, grinding machine parts, and precision instruments.

As America's pioneer producer of 52100 steel, the Timken Company has unequalled experience, assuring you of uniform quality from tube to tube and heat to heat. And we're the only company that makes 52100 steel in tubes, bars and wire.

For fast delivery of your less-than-mill quantity orders, pick up your phone right now. Call The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING

. . . Month's Talk, from Page 18

inch hole — it has to be a one-fourth inch hole in the center of the washer. The effect of automation is to force a new precision and emphasis in inspection.

This same thing was found to be true by a major manufacturer of electrical components for the automobile industry. His automatic machinery has been marvelously productive but he has had to put in 100 per cent inspection of incoming parts.

During this conference you have seen a number of pictures of engine block transfer machines. I know you people are responsible for designing many of them. I recall being in a user plant and asking the manager how it operated on a normal day. He said that he didn't know what a normal day was. It hadn't been normal in a year and a half! He said:

"Just look at this: this line is supposed to make 200 engine blocks an hour. It made 200 last Thursday, it made 200 Friday, it made 205 on Monday and about 195 yesterday and here we are at Wednesday; the thing's making 180 today. We're way low."

I asked, "You had a failure?"

He said, "No, not at all; we just didn't know what was wrong. So here's what I did. I had three blocks yanked off the line and sent to the laboratory for analysis. We found that something had gone off a little bit in the foundry and these blocks were coming through unusually hard. Although they were perfectly acceptable, they were just harder than usual and slowed down some of the machines. The whole darn system slowed down as a result."

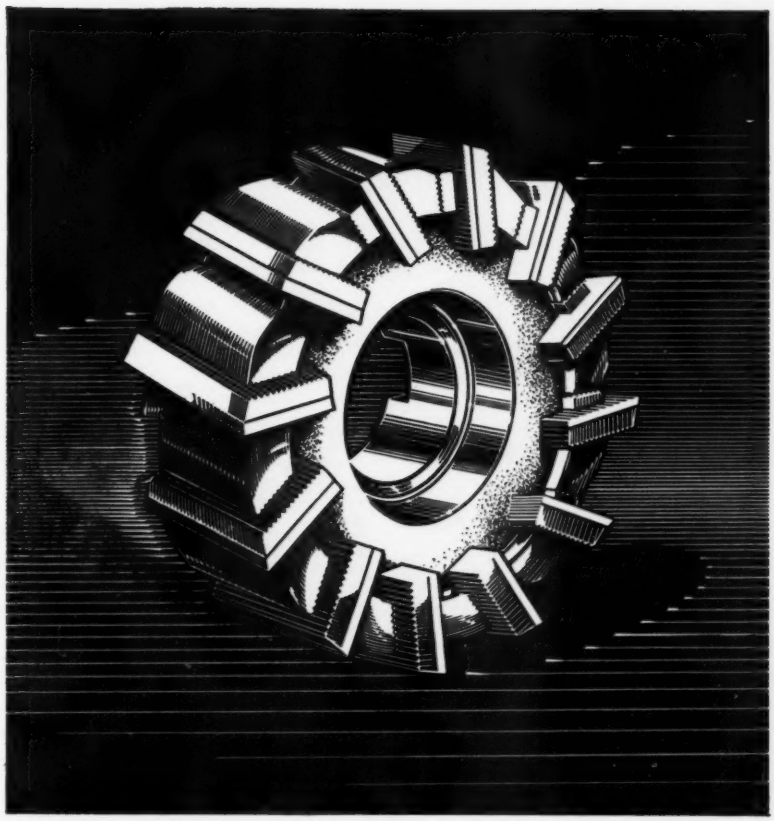
Now again, gentlemen, what is the lesson? It is that the source of supply must be absolutely consistent with what the machine requires. These machines are not flexible as to what variations of material they will accept.

A second point of difficulty is operation:

Now that you have your automatic plant, what do you get into? The first thing is scheduling. Very few people, I find, have thought out the implications of having one big machine. I recall a manufacturer of a product I'll call oil seals. He has a highly automatic line and guess what his problems were! Labor? — no, no troubles at all; maintenance? — nothing significant. He said there was just one headache:

"I wish you could tell me how can I get fractional output out of this machine. I can run one shift to make 10,000 units, two shifts to make 20,000 and 3 shifts for 30,000. But, I can't get anything in between. It's what to do with lots of less than 10,000 that baffles me. It takes an hour to start or stop the machine. If you stop in the middle of a shift to

. . . *Continued on Page 26*



A VERSATILE MILLING CUTTER?

Sure, that's the best description you could apply to a Go & Go inserted high-speed steel blade milling cutter. Here's a tool that's equally at home banging out high production day after day or down in the toolroom carefully carving out a new die. And you can use it on almost any material.

When blades wear, and they do, it's a simple matter to set them out, resharpen and put the cutter back in production. After you've squeezed the last bit of tool life out of the blades, just order new ones from stock and insert them in the cutter body. Blade cost is so low most shops keep several sets on hand all the time.

You can choose just about any style and size of inserted HSS blade milling cutter you'll ever need from the complete line of standards manufactured and stocked by Go & Go. For specifications, ask for Catalog "F". Go & Go also designs and manufactures special milling cutters in quantity. Check your nearest Go & Go representative for details.

Go & Go

GODDARD & GODDARD COMPANY
DETROIT 23, MICHIGAN
Engineering and producing tools that Go & Go since 1917.

CIRCLE INFORM-A-GRAM KEY NO. 23

Choose the Gage that's RIGHT for YOUR job!

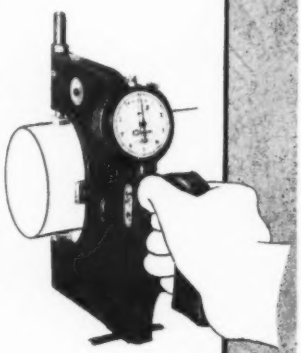
There's a STANDARD® Dial Snap Gage

That Fits Your Particular Requirements... Precisely

Paralloc®

STANDARD's Paralloc anvil locking mechanism maintains parallelism of anvil faces to an unusually high degree of accuracy

L TYPE...



For tough, long run jobs or those involving deep, narrow places

Gages close to shoulders

Flat anvils, faced with tungsten carbide, ideal for close tolerances

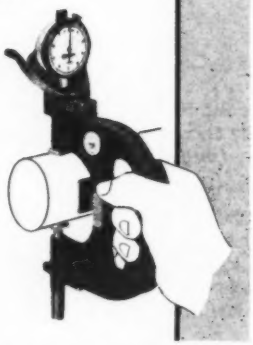
Indicator fully guarded, conveniently placed for easy reading

Sizes up to 14"

Wide range of indicators

D TYPE...

With Paralloc anvil locking mechanism and tungsten carbide faced flat anvils



Lower initial cost

Gages close to shoulders

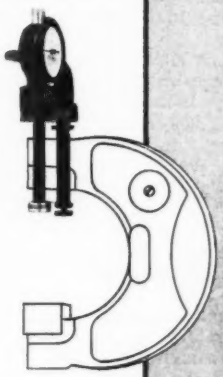
Suitable for long runs where side clearance and forward position of indicator are not important factors

Sizes up to 8"

Wide range of indicators

Dializers®

STANDARD Dializers provide an economical, effective means for converting your AGD Adjustable Limit Snap Gages to Dial Snap Gages.



Fit your present AGD frames of any make, or, if desired, we can supply frames up to 26⅝"

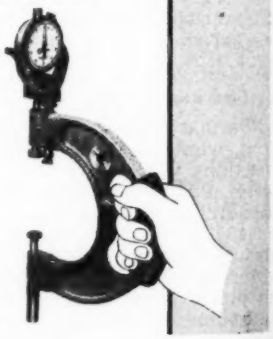
Dializers can be easily installed and transferred from one frame to another

Has radiused contact

The easy way to gain greater efficiency with greater economy

SF SERIES...

Designed for situations where low cost is an important factor and requirements do not suggest need for Paralloc models.



Light weight, sturdy, special aluminum frame

Fitted with Dializer

One contact radiused

Long range of adjustment

Easily adaptable to many jobs

Sizes to 13½"

Write for details on any or all of these models

STANDARD GAGE COMPANY, INC.

MEASURING INSTRUMENTS FOR PRECISION INDUSTRY

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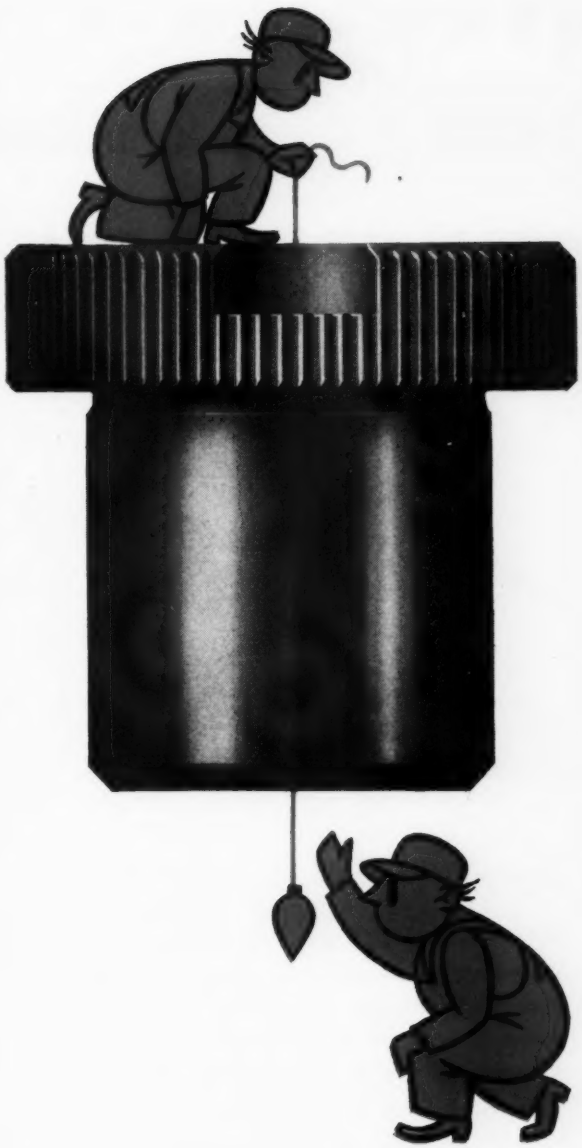
STANDARD® Gages

CIRCLE INFORM-A-GRAM KEY NO. 24

FOR PERFECT ALIGNMENT...

UNIVERSAL
DRILL BUSHINGS

Universal Drill Bushings help increase efficiency and simplify jig drilling operations by insuring perfect alignment of drills. Blended radius on the top inside diameter guides the drill into place and helps prevent tool hang-up and breakage. Superfinish bores keep tool wear to a minimum, especially in close tolerance work. 100% concentricity and hardness tests insure accuracy and uniform high quality. Knurled heads provide a quick, sure grip. Made in a complete range of standard sizes and lengths. Orders for special dimensions will receive prompt attention. For complete information, write to the office nearest you—Universal Engineering Sales Co., 1060 Broad St., Newark 2, N.J.; 5035 Sixth Ave., Kenosha, Wis.—or our home office.



178

UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH 8, MICHIGAN

1 STANDARD COLLET CHUCK
2 FLOATING COLLET CHUCK
3 BORING CHUCK
4 "KWIK-SWITCH" TOOL HOLDER
5 MIKRO-LOK BORING BAR
6 STANDARD DRILL BUSHING
7 UNIVERSAL INDEX PLUNGER

CIRCLE INFORM-A-GRAM KEY NO. 25

DO IT BETTER — QUICKER — AT LESS COST

WITH Atrax SOLID CARBIDE

STANDARDS!

Atrax stock tools eliminate the waste & worry of "specials" 99 times out of 100!

All of the standards in the Atrax line were once "specials" —engineered and built to meet specific production demands. When the Atrax requirements of performance and dependability were proved, these tools were stocked as standards at standard prices—and are now available without delay, to meet virtually all metalworking needs. Whenever you're faced with a tough job, consult the Atrax catalog listing over 1000 standard tools before you order a "special". A production-proved tool to do the job—and do it right—is undoubtedly in stock. Always specify Atrax, you can't get a better tool—you can't get better performance.

Eliminate the cost and delay of "specials" —send today for the Atrax catalog illustrating more than 1000 solid carbide tools to do 99% of all metalworking jobs!

Atrax

THE ATRAX COMPANY

Newington 11, Conn.

. . . Month's Talk, from Page 23

change over to make it, you lose a lot of production time. If I run overtime, it costs me a fortune. I've got to have my orders and scheduling in multiples of shift production. That has bothered me for months."

Another characteristic of these plants is the need for a fast reaction time. Now, it's wonderful the way these plants make parts fast. But did you ever think that they also make bad parts just as fast as they make good parts? When production goes out of whack, you have to find out about it fast!

An electrical manufacturer who has a highly automatic line for making a complex electrical product provides us with an example. One of the steps in his plant is to have the completed product go on to a series of test stands where it is given six or seven tests. These are electrical tests of a fairly complex nature. While visiting the product design engineer for this line, he said to me, "Say, you get around a bit. Would you tell me how you would get information back from this test stand to my office?" I said, "It sounds elementary. Pick up that phone." "Oh, no," he said, "there's a lot of data there and most of this information is too complex to repeat over the phone." "Well, have somebody walk up and bring the papers." "No, my office is 400 feet away from the test stand." "400 feet? Surely that's not going to matter!" His answer was,

"You forget this thing makes one of these units every four minutes."

Much of testing isn't a question of go or no go; it is a question of performance. We know that something is wrong but we don't know where or why it's wrong. We have to think about the faults. Now my question — which some managers of automatic lines are just beginning to appreciate is this:

"What do we do with the plant while we're thinking?"

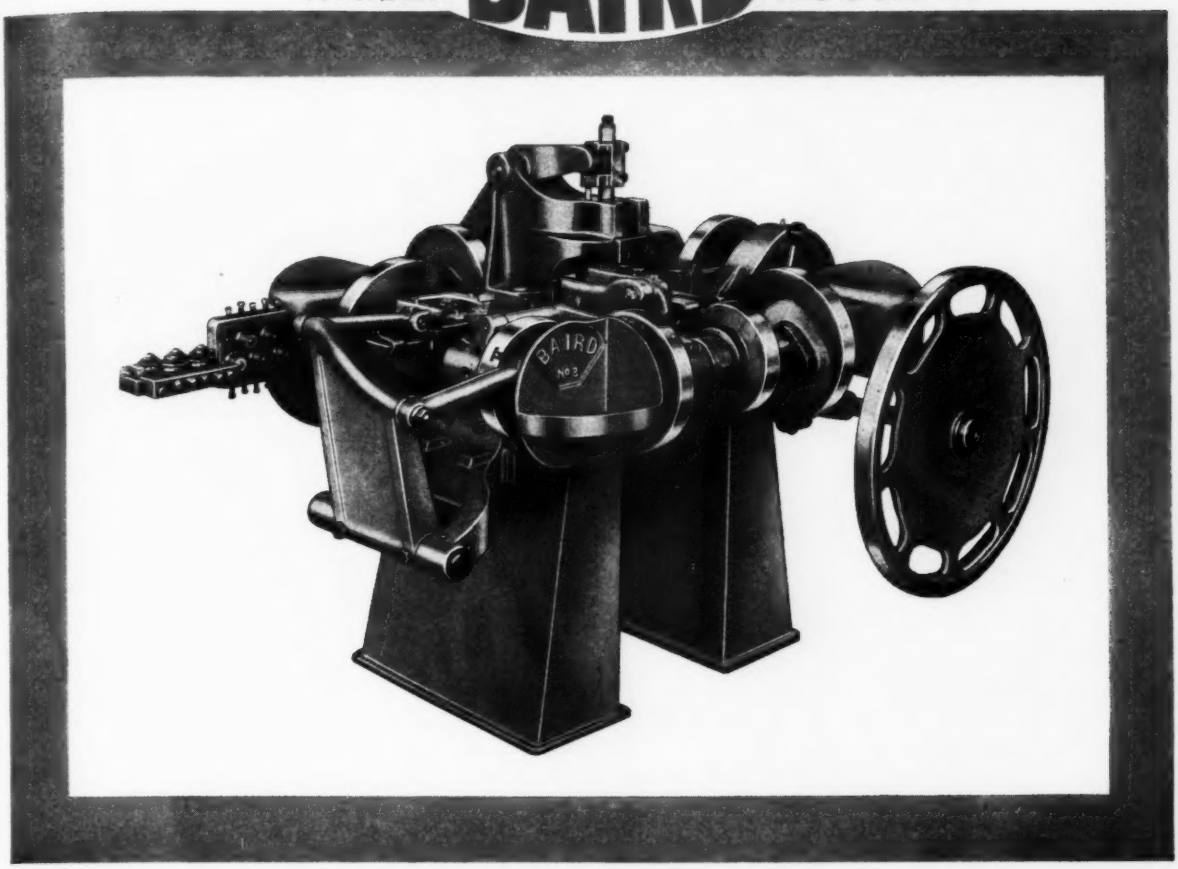
About a month after this conversation my contact got word from the test stand that they were turning out some bad units. One after another faulty units came off. By the time it got up to about 15 or 20 units, he could see that it was going to require some study to correct it. Then he said to the production manager: "You better shut the line down!" The production manager said, "Why?" "Well, there's something going wrong and I don't know how long it will take me to get it fixed. I don't even know for certain what's wrong with it yet."

The production manager said, "Are you authorizing me to shut it down?" "No, no," my acquaintance said, "that's your baby. I'm just telling you, you'd better shut it down."

. . . *Continued on Page 28*

CIRCLE INFORM-A-GRAM KEY NO. 26

...ask BAIRD about it



The "hidden bargain" in a BAIRD Four-Slide

Thousands of Baird Four-Slide users . . . making everything from auto seat springs to bobby pins . . . say it isn't hard to find.

The "hidden bargain" is the cost-reduction know-how that goes along with every machine sold.

Baird pioneered the four-slide machine as the basic round and ribbon wire forming equipment used by every industry making such products. Baird has the most extensive experience files on tooling for this most versatile of high production equipment. Usually the problem that seems tough to the customer can be matched to a previous successful Baird application . . . thereby saving time and money in tooling.

With such a reservoir of past practical experience to draw upon, it's always good business to "ask Baird about it" when a four-slide application is being considered. Our range of standard automatic wire forming machines is complete, from the "bench top" No. 00 (400 lbs.) to the "room size" No. 8 (12,000 lbs.) . . . also two standard sizes of ribbon metal forming machines. Bulletin on request. Write Dept. TP.

THE BAIRD MACHINE COMPANY
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W&B REAMERS

Write for Catalog No. 106

W&B HIGHER PRODUCTION
W&B LONGER TOOL LIFE
W&B SMOOTHER, MORE ACCURATE HOLES
W&B LARGER IN-STOCK SELECTION

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CIRCLE INFORM-A-GRAM KEY NO. 28

. . . Month's Talk, from Page 26

They kicked this ball back and forth a while, and finally the production manager decided to shut it down. The product design engineer finally traced back the trouble and found that at an early stage in assembly an operator was supposed to measure a relationship and to adjust two parts to that relationship. Somehow the operator hadn't been adequately instructed. He simply measured the relationship, marked it, but didn't adjust the parts. As a result the product came out wrong at the test stand. Now you can say this is a failure in training. Of course it is, but while this error in training was being located and tested, the line had turned out 200 faulty units at about $10 each! What does this mean? When you have this kind of a plant, it becomes a catastrophe of major proportions when something doesn't function right. If it can become a catastrophe, do we not have to plan for it just as we plan for a fire drill or any other emergency? The question for management is this: Are our organizations prepared to deal with this kind of catastrophe? Do we know where the authority lies? Do we know exactly what steps are required and are to be taken to correct each kind of trouble? In most plants the answer is "No", yet this is one of the things management is going to have to face.

The third operating problem is the impact of automatic systems on output.

Now I recall a certain V-8 engine which was supposed to get a new fuel pump a few years ago; it called only for milling a flat in the side of the engine block and drilling a couple of holes. A member of the firm that makes the fuel pump said, "You know, so and so isn't going to get their fuel pump this year." "Why not?" "We have to mill this flat and drill a couple of holes."

To pull this automatic line apart and insert these elementary operations in the line will cost about ¾ million dollars. That's why the Chief Engineer said: "I think this is going to change our product policy. We're going to have to collect changes. We sure can't afford to make them piecemeal."

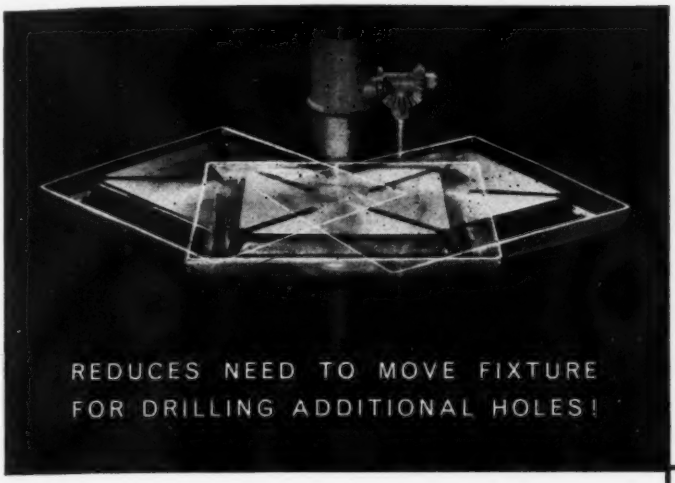
Now what are the implications of this?

There are a number of highly automatic plants making foam rubber mattresses. They are essentially conveyor units that continuously pull molds through ovens where the baking takes place. As the molds move out of the oven, operators strip the foam rubber mattresses out of the mold, throw them on another conveyor that takes them to a washer and to other operations. Then the mattresses go into the finishing line.

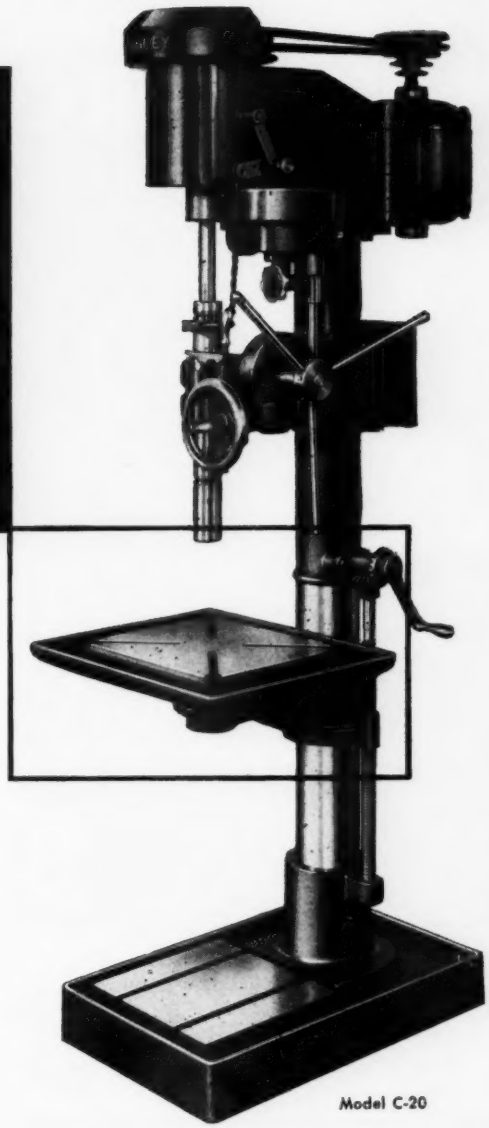
In visiting one of these plants —

. . . Continued on Page 35

Sibley Table Swing Saves Set-up Time!



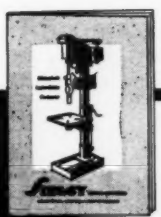
REDUCES NEED TO MOVE FIXTURE FOR DRILLING ADDITIONAL HOLES!



Model C-20

Lick the largest cost item in the toolroom, die shop—or small lot production! Rapid positioning by rotating table arm overcomes need to change set-up.

- **Geared power feeds. Dial selection.**
- **Back gears for extra power.**
- **Drills 1¼" in steel plate.**
- **Accurate. Rugged. Convenient controls.**
- **Sensitive for "feel" of job.**
- **20" swing. 2 h.p. motor.**

Send for  *Free Catalog!*

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SIBLEY MACHINE & FOUNDRY CORP.
Dept. TP-10, South Bend 23, Indiana
Send Catalog No. 67

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Company_____

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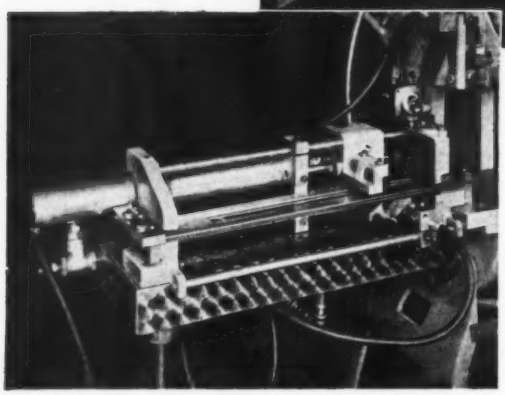
CIRCLE INFORM-A-GRAM KEY NO. 29

EVERYTHING
FOR THE
PRESS ROOM
BUT THE PRESS

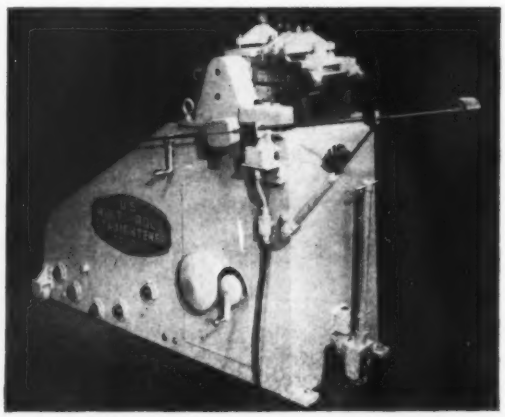
Right: Conventional OBI Punch Press equipped with U.S. Slide Feed with Plain Straightener and U.S. Multi-Roll Cradle.



Above: U.S. Air Operated Slide Feed (no mechanical connections to the press), open side type, suitable for material up to 15" in width and feeding length adjustable up to a maximum of 12" at one stroke. Longer feed lengths obtainable by cycle feeding with counter.

Reduction of costs is a primary concern of all manufacturers. Units included in the line of U.S. Automatic Press Room Equipment such as U.S. Slide Feeds, Roll Feeds, Stock Reels, Coil Cradles, Stock Oilers and Wipers, Scrap Choppers, are designed and built with the aim of converting the punch press into an automatic machine. The end results are increased production, reduced scrap, reduced operator fatigue, reduced material handling and overall reduced costs.

If you use presses in your production processes, ask for copies of Bulletins 80-P and 95-P.



Left: Model PDSC-940 U.S. Combination Coil Cradle and Power Driven Straightener suitable for material up to 9" in width and coils with O.D. up to 40", weight capacity 1,500 lbs.

U. S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides — U. S. Multi-Millers — U. S. Automatic Press Room Equipment—U. S. Die Sets and Accessories

CIRCLE INFORM-A-GRAM KEY NO. 30

Which do you buy...

PRICE or VALUE

Why are quotations considered on the basis of price alone, when value is usually the thing being purchased?

The true cost of the gage is the reliability of the supplier, accuracy of gage, and cost per piece inspected.

At The Pipe Machinery Co., gages are made by a team of skilled craftsmen who make the finest gages at a fair cost. We propose that you buy the value that thousands of PMCo customers have found in our gages.

Your inquiry is solicited for the highest value in gages available.

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ACME DOWEL PINS

ARE NOW SOLD ONLY THROUGH INDUSTRIAL SUPPLY HOUSES

Write for information and prices on micro, standard and tungsten carbide drill jig bushings, dowel pins, chamfer micrometer gages and portable bench centers.

- Sizes from ⅜" to 6" in length—⅛" to 1" in diameter. Standards and specials, including pins of stainless steel
- Precision pins, hardened and ground to .0002" or .001" over nominal diameter—oversized: .002", .003", .004" and .005"
- Acme Pins are case hardened to 60-62 Rockwell "C" scale and core hardened to 36-38
- Acme Pins will break before bending or mushrooming

If your distributor does not yet stock Acme Dowel Pins, please send us his name so we may avail him of a stock. Also ask for Acme Dowel Pin Folder.

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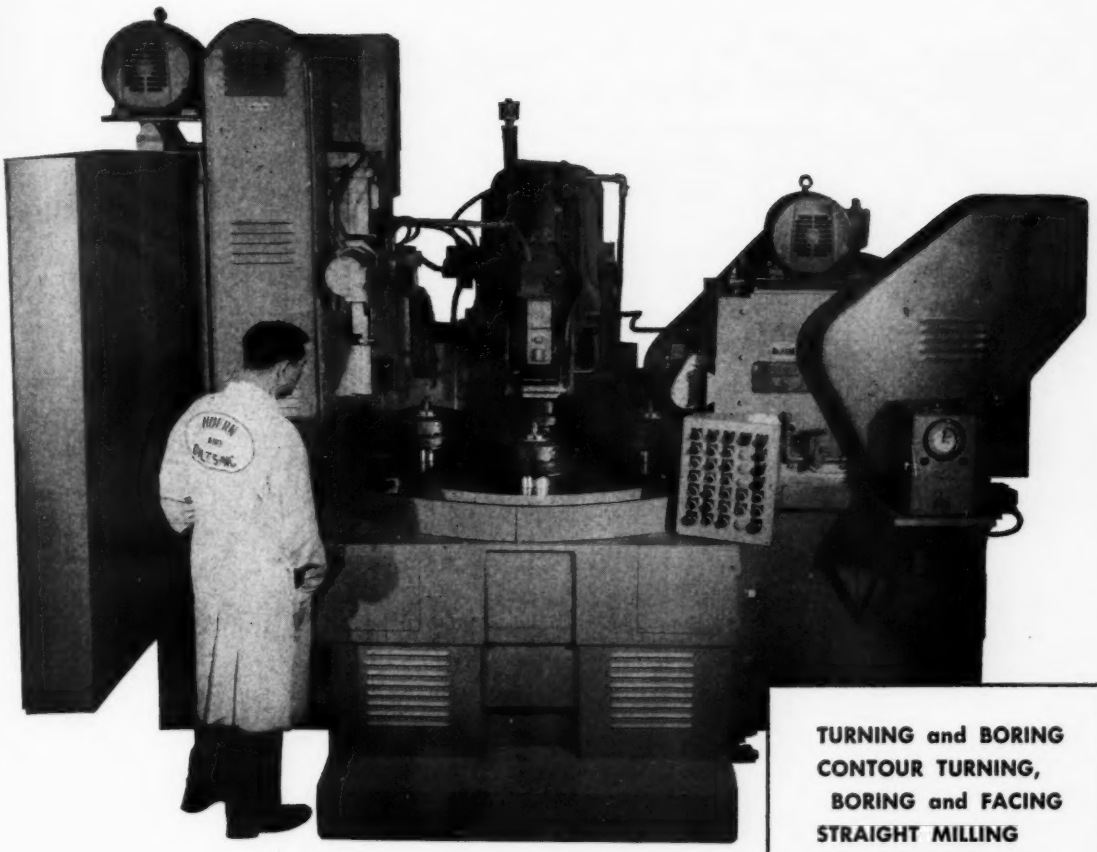
CIRCLE INFORM-A-GRAM KEY NO. 32



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STRAIGHT MILLING
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O. D. GRINDING
SURFACE GRINDING
SURFACE HONING

You can combine these finishing operations on one Hoern & Dilts indexing finishing machine →

Indexing Table: Mounted on pre-loaded roller bearings. Index accurate to .0002". By providing adjacent spindles with proper chucking devices, *both ends* of a piece may be put through identical or closely related operations.

Heads: Individually cam-actuated heads, each designed for a specific type of operation which may be performed vertically or horizontally as required. Heads self-contained, with individual electrical, pneumatic and lubricating systems.

Speeds: One over-all speed may be used, or a different speed at each station. Spindles may be stopped and locked in any predetermined position at any station.

Feeds: Individually adjustable for each head.

Grinding Operations: Wheels dressed and compensated during index.

Automatic Gauging and feedback adjustment available at all stations.

A Hoern & Dilts Indexing Finishing Machine handles with *one* chucking and one operator, the operations ordinarily performed by several operators using completely different types of equipment.

This advanced approach to increased, more accurate production is accomplished by arranging a variety of self-contained heads around a central indexing table in which the spindles are mounted. Since all the operations are performed with a single chucking, all the proper relationships are maintained.

Hoern & Dilts engineers will welcome the opportunity to cooperate with you on any high production finishing operation.

HOERN & DILTS DIVISION

The New Britain Machine Company
Saginaw, Michigan

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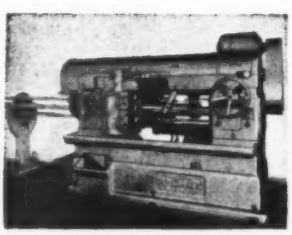
Precision Horizontal Boring, Drilling and Milling Machines

CIRCLE INFORM-A-GRAM KEY NO. 33

If you haven't read this important booklet, your production line may be operating at less than peak efficiency. Your operations may be beating competition with HSS today, but you will likely need carbide tooling to be the leader tomorrow.

Write for your free copy of this important booklet today!



Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U.S.A

CIRCLE INFORM-A-GRAM KEY NO. 34

. . . Month's Talk, from Page 28

which was highly efficient — I got back into the tail-end of the line where the mattresses are finished, the tapes sewn on and a few other operations performed. There were mattresses stacked all over the place.

I said, "What happened? Did you have a failure?"

"No, the sales changed. The plant was designed for 15% seat cushions, 85% mattresses. But sales are now 30-70. When you ask this system to make any more than it was designed for, it's not so hot. That's one of the problems in living with it."

The fourth impact I would like to discuss is the impact on sales.

The public, Congress, the unions, and everybody else seems to worry about labor. My observations lead me to think that the real problem is not labor. The people who are going to feel the pressure of automation are the salesmen and the sales department. I think of one plant that created a highly automatic line. The production manager was the guiding genius on this line. After it was successful, the general manager called him in to say: "You did a nice job. Now, since you're so smart at making them, let's see you sell the stuff!" So they made him sales manager!

He told me that the trouble he had building the line was nothing compared to the trouble he has selling the product. Why? He said, "How do you get a 75 year old sales force to change its habits? They won't sell what we can make; they want to sell whatever the customer wants!"

His main hope was to use the pricing policy to force the customer to order standard, rather than special, units. He felt that was better than trying to teach some of the salesmen.

I saw him later and asked him how it worked out. He said, "Not as I hoped, but I'm still trying."

There is one other significant impact on the sales department and the foam rubber plant is a perfect example.

The vice president of manufacturing said, "This line is wonderful, but there are some interesting points about it. We have to run it three shifts because it takes an hour to start it and an hour to stop it. We can't afford that, so we run it three shifts and work five days a week."

I said, "Suppose you have a surge in sales, what do you do?"

"Well, I can run Saturdays, but I can't run it any faster."

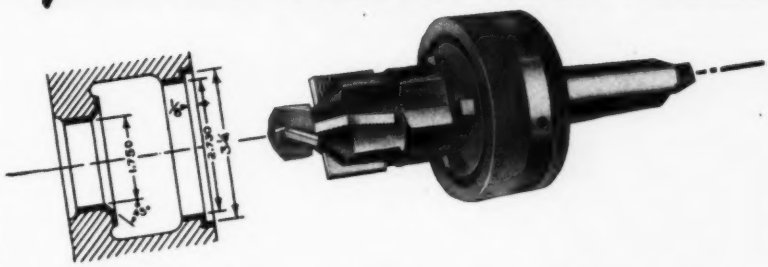
"Suppose sales fall off, what do you do?"

"Nothing; I can't do anything. I can't save any people on it; every single man is essential. There is no way to slow it down; no way to save money by running it slower because it gets more expensive. And this sys-

. . . *Continued on Page 38*

Cut Costs WITH McCROSKY *Special* PRODUCTION TOOLS

COST CUTTING TOOLS



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Please send Bulletins describing the tools checked below.

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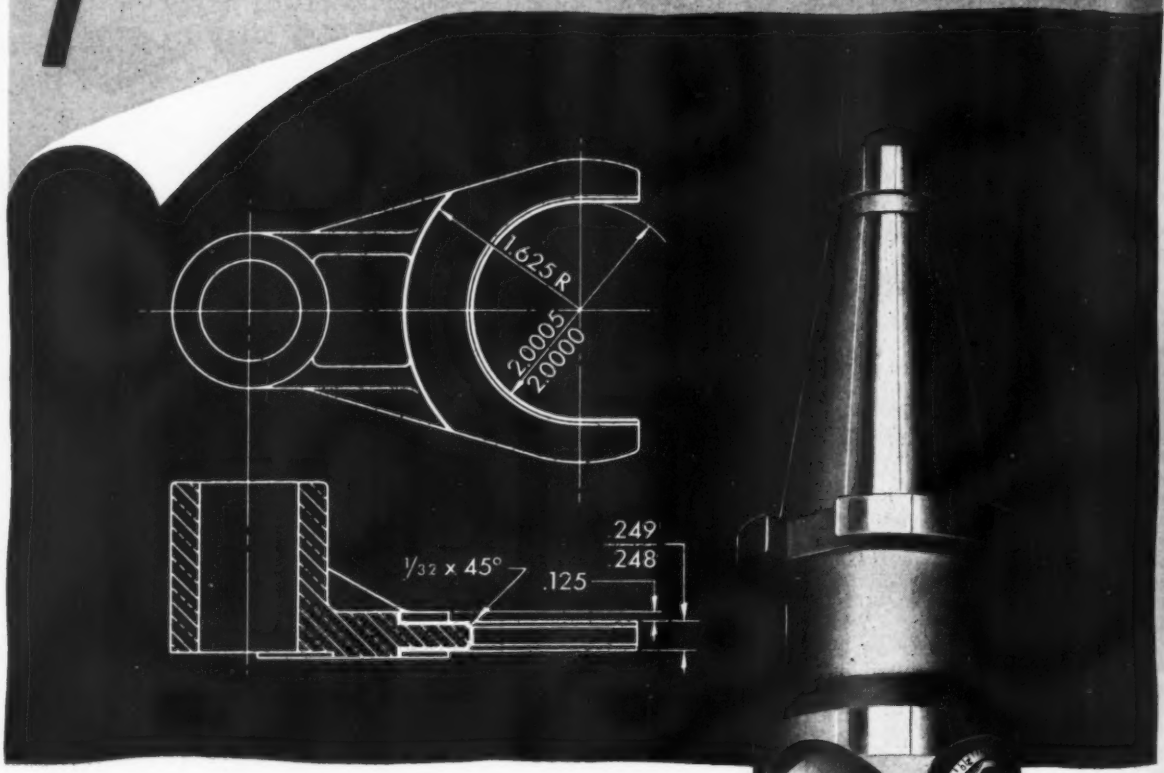
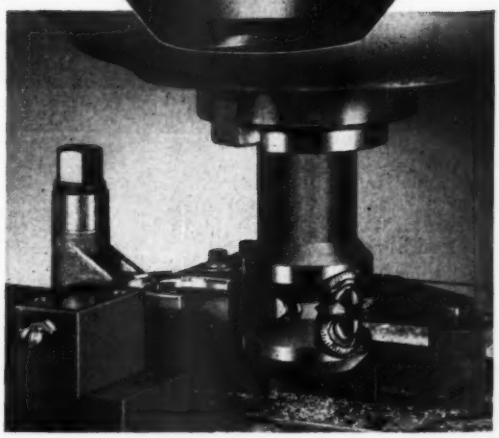
CIRCLE INFORM-A-GRAM KEY NO. 35

7 SURFACES on SHIFTER FORK MACHINED AT 1 PASS!



And held to precise limits by using MICROBORE® Precision Tooling-

Illustration shows setup for completely machining shifter forks on standard Vertical Milling Machine to precise limits of accuracy on a production basis. This application of Microbore Cluster Tooling permits use of simple low-cost work holding fixture, and substantially reduces tool costs per piece.



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Microbore®
PRECISION TOOLING

DEVLIEG MICROBORE
DIVISION OF DEVLIEG MACHINE COMPANY
2720 West Fourteen Mile Rd. • Royal Oak, Michigan

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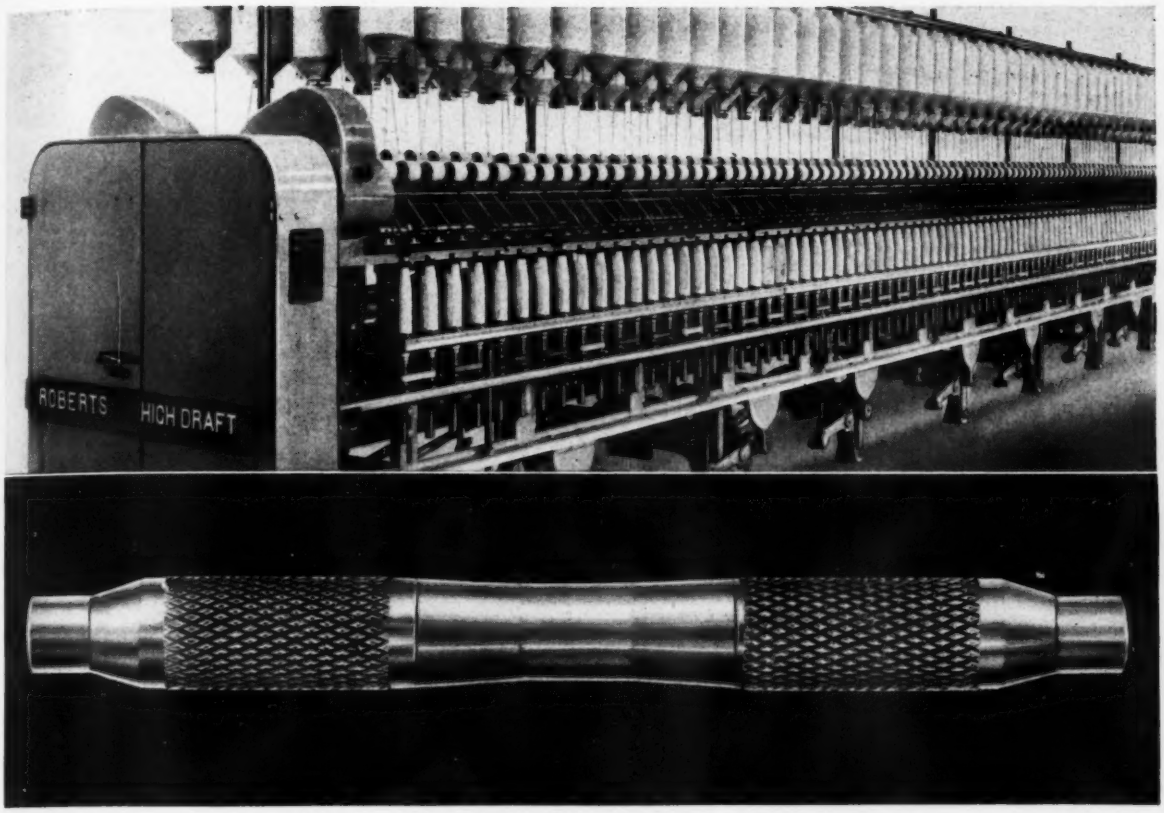

Roberts Co., internationally known textile machine maker

Improves finishes to 10 RMS... slashes costs $35.84 per thousand "top rolls"

Roberts Company of Sanford, N. C., specialists in spinning frames, was using polishing wheels and wire brushes to finish hardened steel top rolls—dry bearing components of its textile spinning machines. Costs were a high $39.40 per thousand finished rolls and the best finish obtainable by this method was an often unsatisfactory 50 to 60 micro inch.

A HONITE Field Engineer suggested that this company switch to the HONITE Barrel Finishing Method, using HONITE Compounds and HONITE Chips. The results: Costs per thousand finished top rolls immediately dropped to a low $3.56 . . . finishes improved to a high 10 micro inch *and* the life and lubrication requirements of the finished rolls increased a full 100%.

You can cut costs with the HONITE Barrel Finishing Method, too. Write today for full facts!

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☐ I'd like to talk with a HONITE Field Engineer
☐ Send me FREE copy of booklet "Facts and Figures Report on HONITE Barrel Finishing"

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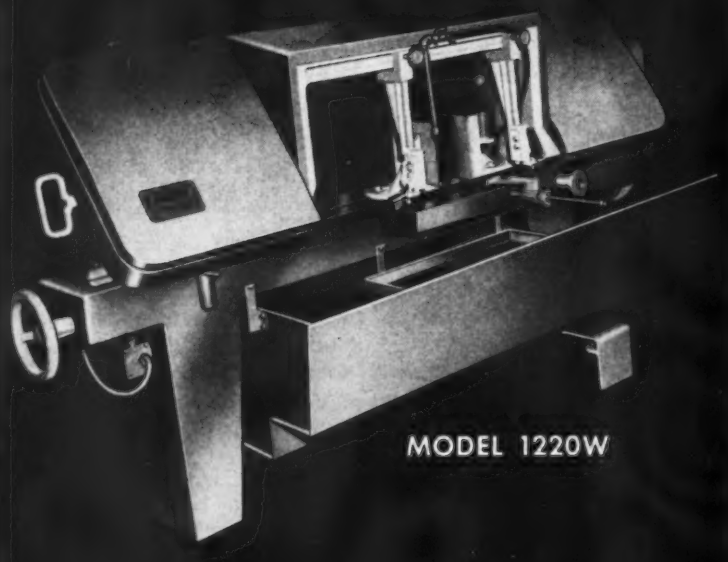
...worth more to you

For a big, fast machine that will give you high-production sawing of 12-inch round stock, 20-inch flat and 12-inch pipe—and maintain hair-line accuracy—write for complete details or contact your local Kalamazoo distributor.



MODEL 1220W

MACHINE TOOL DIVISION

Kalamazoo TANK and SILO COMPANY

1015 HARRISON STREET . . . KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 38

. . . Month's Talk, from Page 35

tem is so darn expensive you've got to keep it going."

Here is the question I would like to bring up:

If we can't speed the line, if we can't save money by slowing it down, and if we can't afford to stop it, what do we have to sell? We have a **fixed output** to sell, no more and no less. So who is the sales department working for? The factory used to work for the sales department. When these automatic plants come in, the sales department may find that they work for the factory. The factory as a machine is quite inflexible. It puts a premium on continuous, fixed rate production. Then it paces the sales department just as it paces the worker.

What is the right size for the automatic line? Well, most managers laugh when you raise this question. Of course, they say, you make one line because it's most economical.

Yet, one engine plant manager says that absolutely the smartest decision they made was to put in two engine block lines instead of one.

When all your production is committed to one line, 100 per cent of your production depends upon that system. One cannot get any product mix.

I think that in time to come it will be seen to be very wise to build two or three small lines rather than one big line, particularly in the multi-product plant. Then you have a chance to manufacture various product mixes and to operate when part of the system is down. It is clear that we need much more thinking about this aspect.

Very briefly, now may I suggest a few points to you as machine tool manufacturers. Probably all of you know that Plymouth took a new approach in their engine plant. They divided the engine block line into three parts. Then they gave the successful machine tool manufacturer the responsibility of procuring and installing a complete set of operating equipment for his third, regardless of whether he normally makes all of that equipment. Furthermore, it was to be installed and making successful parts before acceptance.

This is a very significant trend appearing in many places. What does this mean? **It shifts the engineering from the user to the vendor.** Is the vendor ready to take on this kind of engineering load and responsibility?

Second, the vendor must acquire new machine building arts. He may be great on grinders, how is he on drilling machines? How is he on material handling equipment?

Third, it shifts the responsibility for operating success from the user to the vendor. It's not enough to sell a machine, now you have to make it

. . . Continued on Page 41

A world-wide business built on quality files . . . Nicholson File Company is the largest file maker in the world

NICHOLSON

BLACK DIAMOND U.S.A.

Because files are such universally important hand tools, Nicholson File Company has built a world-wide business specializing on this one product alone. In industries, shops and homes throughout the free world, Nicholson and Black Diamond are the best known and most widely sought after file brands. To fill this demand at lowest cost to file users, Nicholson has recently built ultra-modern plants in Canada and The Netherlands. There, as in its three factories in the United States, efficient file-making equipment plus constant file research combine to make Nicholson the world's leading manufacturer of a file for every purpose.

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A FILE FOR EVERY PURPOSE

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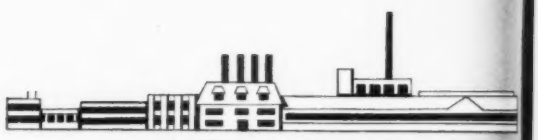
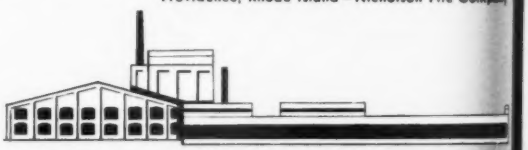
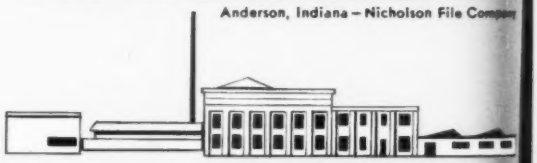


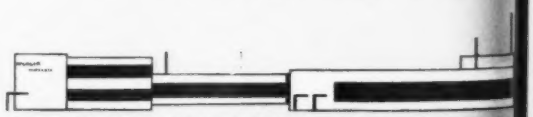
Providence, Rhode Island – Nicholson File Company



Anderson, Indiana – Nicholson File Company



Philadelphia, Pennsylvania – Nicholson File Company



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's-Hertogenbosch, Netherlands – Nicholson File Nederland N. V.

. . . Month's Talk from Page 38

work in the complete operating environment.

The advantage, I believe, is going to go to the firm that sells successful manufacturing systems rather than individual machines.

Fourth, what kind of a sales force is needed to sell such systems? What kind of an engineering force is needed to make them? I suggest that very few machine tool firms are now facing up to this trend and its implications.

There is another interesting sales point here: The foam rubber plant I studied was not built by a foam rubber machine manufacturer or a mold manufacturer, or an oven manufacturer. It was conceived and executed from stem to stern by a conveyor equipment manufacturer. Now an oven manufacturer has seen the handwriting on the wall, so he is competing by offering the same kind of system and subcontracting the conveyor part of the line. Then the point is: **when everybody will build everything to whom does a customer turn?** Does he go to a machine tool manufacturer or to a materials handling manufacturer? To which machine tool manufacturer, if everybody offers the same system? I don't quite know where this leaves machine tool builders, but I think they may be competing with new sources.

I believe that the customer is prepared to buy experience and he will buy proven success from any source. Therefore, there may be a new, competitive edge to taking jobs for experience.

Another interesting point: who does the minor manufacturer sell to? Let's say, for the sake of argument, that some kind of inspection machine has formerly been sold to, say, Plymouth. Now this supplier's contacts are not too useful. He has to sell one prime supplier of the line. Does he have such a sales plan and contacts?

I wonder if this means that we're coming to teams of companies, to pools of engineering effort? Should companies merge or get working arrangements with supplementary manufacturers — the drilling machine builder with the broach manufacturer, etc.? Is your present sales force adequate for this kind of selling? In the past you have been selling machines. Now you may have to sell systems.

I have suggested many troubles ahead in automation but there are enormous advantages too — labor, quality, reductions in lead time and material cost, safety, improved working conditions, increased flexibility, a smaller plant, and even the possibility of lower investment per unit of production. Very few salesmen, I found, ever sold user firms all these benefits. The user learned them for

. . . *Continued on Page 42*

The Critic Of Critical Angles

Test fixture reveals any errors in optical mounts

The picture above illustrates a solution in which the test fixture seems to be a complicated, specially designed apparatus. It is, however, just a multiple application of standard Davidson D-600 auto-collimators and divided circles on a stable base.

Davidson engineers, optical and mechanical, are well qualified to meet any problem you may hand them in precision measuring.

Davidson's splendidly equipped and integrated plant (the finest in Western America) can produce any precision instrument or optical element in quantity.

In the fields of measurement, photography, astronomics and missile tracking, Davidson may have a ready-made solution for the problem that faces you.

THE PROBLEM: to check the position of optical elements when mounted in an instrument.

Mounting error in angularity to be checked in two planes, azimuth and elevation in increments of 1 degree.

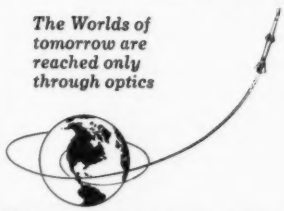
Accumulated error over the entire range could not exceed ±3 seconds. Total range of the instrument whose elements were being calibrated was 60° azimuth and 45° elevation.

THE SOLUTION: Davidson built a test fixture to hold the production run instruments exactly during inspection. The fixture also positioned two Davidson D-600 auto-collimators and two Davidson optical reference mirrors in correctly calibrated angles in relation to the instruments being checked. By use of optical lever principles, multiple reflections from the test specimen in its mounting, together with its reflected image in the reference mirror, were compared in the two auto-collimators (one for each plane).

Errors in the mounting of the test specimen were thus magnified by a factor of two giving easier readout and correction.

The Most Accurate Measurement Is Made With Optics

The Worlds of tomorrow are reached only through optics



— and the most accurate and versatile optical instruments in this country are designed and wholly built by —

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CIRCLE INFORM-A-GRAM KEY NO. 41

Now Available

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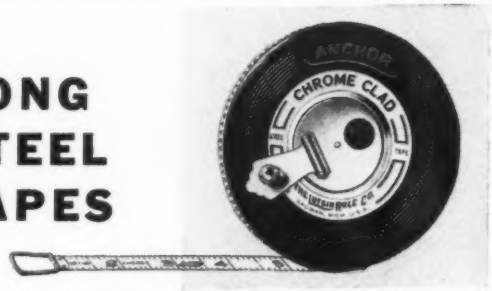
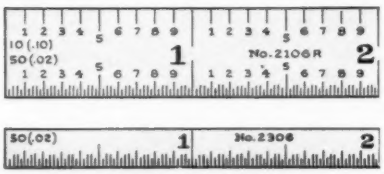
DECIMAL GRADUATED

LONG STEEL TAPES



Genuine leather case, Chrome Clad rust-resistant tape, jet black markings in 25 and 50 foot lengths. Graduated in consecutive inches full length, both upper and lower edges, to 10ths (.10) inch.

STEEL RULES

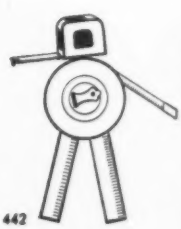


Machine divided, black filled lines and figures, full range from very flexible to heavy spring tempered with plain or Chrome Clad finish. No. 6 Graduated: 10ths (.10) and 50ths (.02) inches.

TAPE RULES

Rust-resistant Chrome Clad finish, easy-to-read bold black markings, in 6, 8, 10 and 12 foot lengths with heavily plated durable case. Graduated to 10ths (.10) inch throughout length. First 12 inches, lower edge to 50ths (.02) inch.

Chrome Clad finish, a Lufkin exclusive feature on its complete line of decimal graduated measuring devices, provides a harder, more durable, non-glaring finish and increases tool life. It wipes clean and protects against wear, abrasion and rust.



Call YOUR LUFKIN INDUSTRIAL DISTRIBUTOR TODAY! His knowledge of new tools and methods will help you operate at peak production.

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THE LUFKIN RULE COMPANY, SAGINAW, MICHIGAN
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CIRCLE INFORM-A-GRAM KEY NO. 42

. . . Month's Talk from Page 41

himself. These are enormours gains under some situations. Some of your sales people may want to give more thought to selling the gains other than labor. Obviously, these advantages offer tremendous sales opportunities to machine tool builders, and to firms who will use automatic manufacturing in an optimum way.

You machine tool builders represent the spiritual inheritors of American production genius, literally as well as spiritually. You are the men who are carrying on this tradition of progress and productivity. In spite of all the difficulties, I am sure that you will go on to greater things. For you there is no more apt theme than a quotation from Rudyard Kipling:

"They copied all they could follow,
But they couldn't copy my mind.
So I left them, sweating and stealing,
A year and a half behind."

Wesson Expands Eastern Activities

Wesson Company has expanded its field and service organization activities in the East to provide direct field engineering representation throughout the Middle Atlantic and adjacent areas.

New sales and service engineering organization headquarters has been set up in East Paterson, N. J. James J. Smith, Jr., is in charge of operations as eastern district manager. Covering the southern part of the area — Virginia, Maryland, Delaware and the District of Columbia — is Joseph Maurer.

Charles Ensign is responsible for sales and service engineering in Fairfield County, Conn., and part of New York, including metropolitan New York City. Frank Mercer represents Wesson in the northern half of New Jersey and southeastern New York.

Office manager of the eastern district office is Mrs. Frances Walser, formerly in charge of the firm's Philadelphia branch. Eastern stocks of Wessonmetal carbides and Wesson cutting tools, particularly standard tools and tips, are being enlarged and coordinated at the district office for quick delivery to all parts of the area.

Other members of the company's eastern organization are Sal Ianiello, George Murphy and William Terry.

"KNOW-HOW" REPRINTS ARE AVAILABLE

Consult The Advertiser's Index . Under . Huebner . Publications.

Acme-FETTE

Cuts threading costs to $0.00003 per piece

On an automotive part that required millions of *duplicate* pieces, one manufacturer found that the application of Acme-Fette thread rolling heads enabled him to:

1. Get required production with 9 Acme-Gridley bar automatics instead of 14.

2. Secure better threading results with rolled threads which provided smoother, tougher threaded pieces.

3. Show a unit threading cost of *3 one-thousandths of a cent.*

4. Reduce total cost per piece more than 33⅓% while producing in excess of 35,000,000 pieces.

Why not check Acme-Fette advantages on your threading jobs?

New Acme-Fette Type N self-opening thread rolling heads are used with either rotating or non-rotating spindles. They let you complete threaded jobs on your present turning equipment without rehandling — roll threads *5 times faster* than thread cutting methods (and with no chip problem).

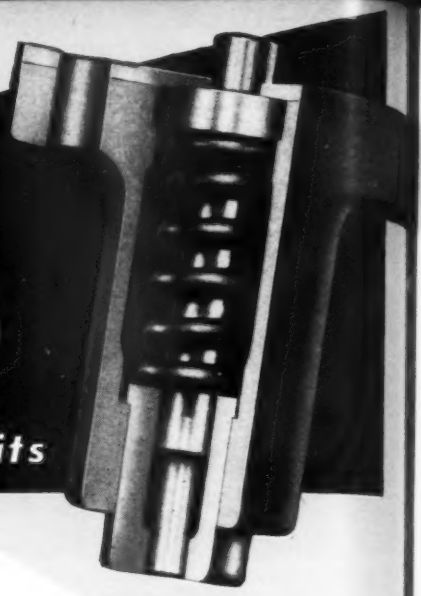
National Acme

THE NATIONAL ACME COMPANY, 169 EAST 131ST STREET, CLEVELAND 8, OHIO

SALES OFFICES: • Newark 2, New Jersey • Chicago 6, Illinois • Detroit 27, Michigan

WALES CD UNITS

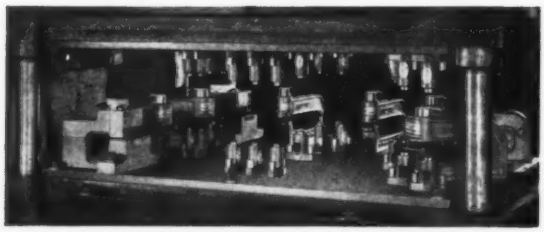
INCREASED our HOLE PUNCHING *Profits*



● You can always *save* **TIME** and **MONEY** with WALES CD Units. **ELIMINATE** stripper plates . . . **ELIMINATE** custom punches and dies. No more heavy investment in tooling inventory.

CD UNITS are mounted in sets — outside the press — and operate the same as conventional custom dies . . . except for the necessity of individual die-sets. Change set-ups in 'jig time'. All parts are interchangeable. Maintenance costs are pared to the bone. Alignment is automatic and accurate.

Press down-time is practically non-existent. For multiple hole punching, nothing equals the speed and simplicity of **WALES** CD punch and die assemblies.



Showing WALES CD Units in same set-up with WALES BL Hole Punching Units and WALES Type N Notching Units in punch press.

For punching round or shaped holes up to 2" dia. in ⅛" mild steel.

Other WALES units available for punching holes up to 3½" dia. in stock up to ¾" thick.

Send for Bulletin No. 11J

The CD story is factual and sure to suggest many ways to enable your hole punching shop to make more money. Sent free.

WALES MOBILE FIELD UNITS

Ready to visit your plant with the fabulous Wales Fabricator and Positive Duplicator and the complete line of WALES hole punching equipment. Send for date when we can give you demonstration. No obligation.

WALES Strippit COMPANY

"...the Wales-Way is the PLUS-PROFIT way"

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WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONT.

NOISY GEARS ELIMINATED AUTOMATICALLY

A consistent electronic ear in the Red Ring Gear Speeder has replaced the human sense of hearing which, as we know, varies with the fatigue and mental attitude of the listener.

This electronic sound discriminator is readily adjusted to reject gears at any point within the range of audible noise frequency and intensity.

The Model GSR Speeder for gears and pinions in the smaller sizes is fully automatic. Gears are loaded, run in both directions, with and without a brake load and are either passed or rejected by the electronic sound discriminator as a continuous operation. ***Write for Details.***

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ORIGINATORS OF ROTARY SHAVING
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NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN • DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

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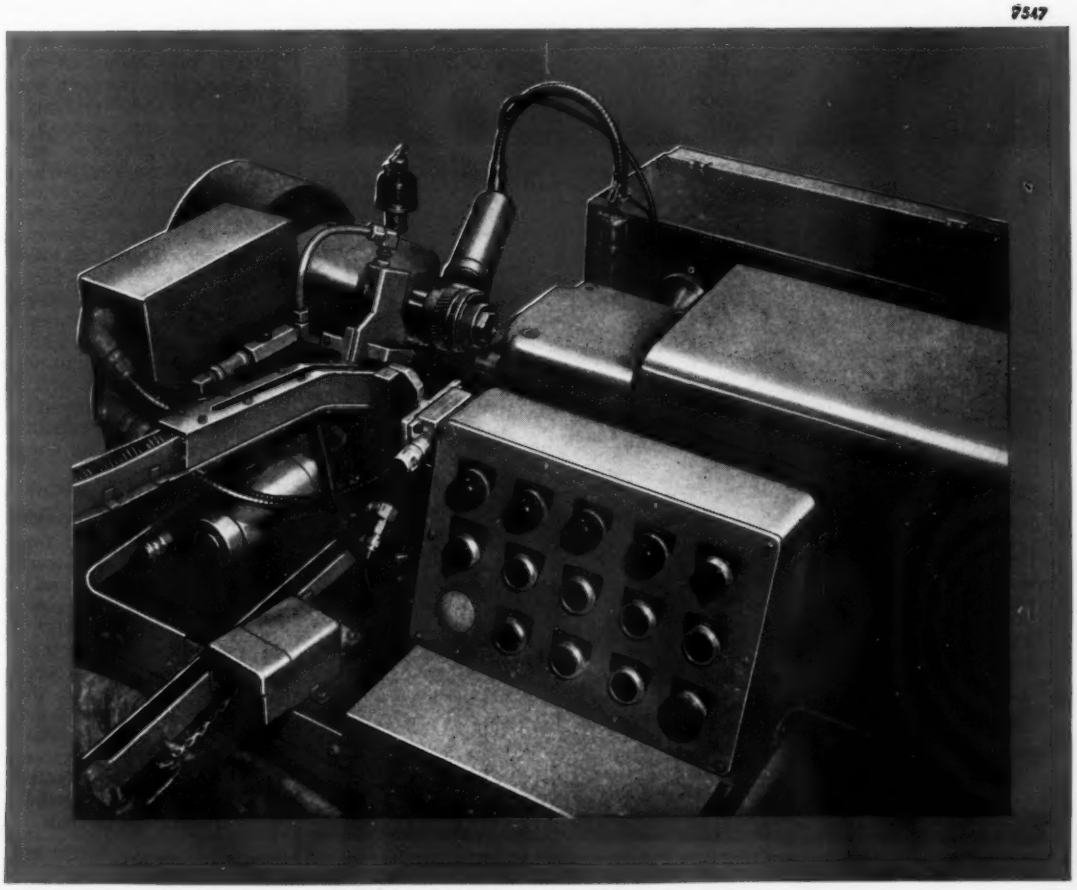
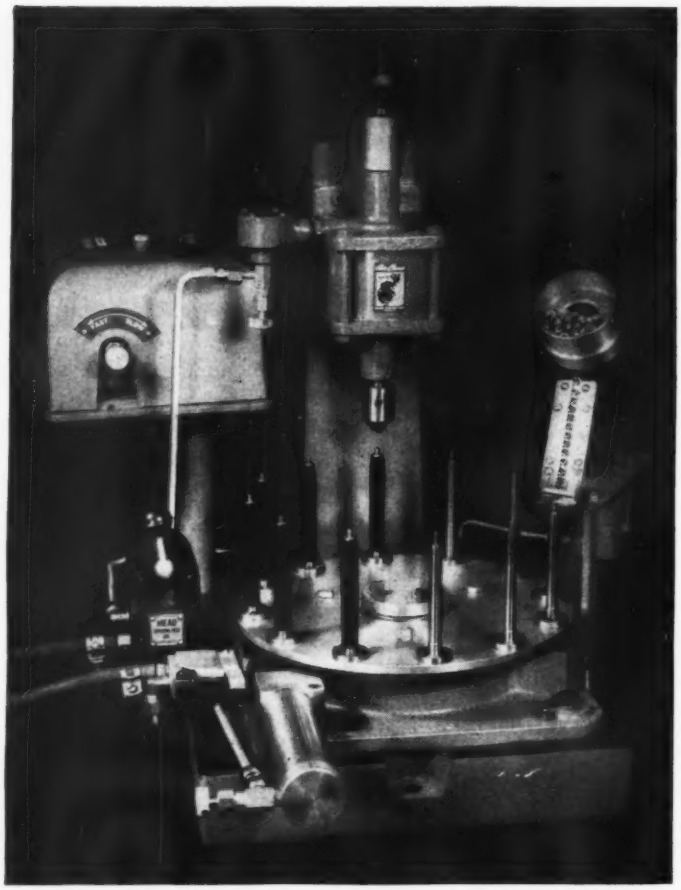
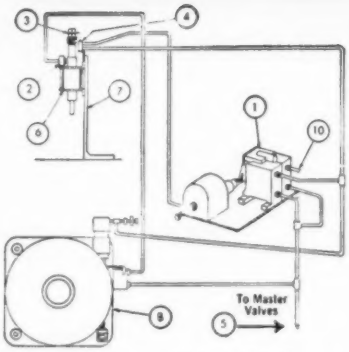


CIRCLE INFORM-A-GRAM KEY NO. 45

AUTOMATION with AIR POWER

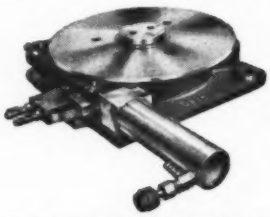




Circuit Diagram of Units in This Photo

Combine readily to feed work to drill press, air impact hammer for a wide variety of operations.

MEAD ROTARY WORK FEEDER is the heart of this machine to crimp eyelets and rings on pen barrels. A simple combination of standard Mead units makes a semi-automatic machine—operator merely loads.



The **ROTARY WORK FEEDER** Indexes to 8, 12 or 24 stations, at speeds from 15 to 150 stations per minute. Auxiliary valve actuates drill press feed or other pneumatic tool as each station indexes.

(1) Meadmatic Timer controls cycles per minute and "dwell". (2) Speed control valve and quick exhaust valve regulate advance and retraction of tool. (3) Adjustable depth stop. (6) Single-acting air cylinder. (7) Vertical stand. (8) Rotary Work Feeder. All units mounted on Universal Base.

MEAD

Write for free booklet of 44 "EXAMPLES IN AIR POWER AUTOMATION."

SPECIALTIES COMPANY, 4114 N. Knox, Dept. HA-106, Chicago 41, Ill.

PATHFINDER IN AIR POWER AUTOMATION

CIRCLE INFORM-A-GRAM KEY NO. 46

People Are Important

by Erwin K. Taylor, Ph. D.
President
PERSONNEL RESEARCH AND DEVELOPMENT CORP.
Cleveland 20, Ohio

"WHY BOTHER?"

FOR MANY JOBS, and in many localities, the current labor market is probably tighter than we've ever known it to be in this country's history. It is not only tool and diemakers that are in short supply, not only chemists and technicians, but clerks and stenographers and salesmen and benchhands. Yes, in some places, even common laborers. About the only people who are profiting from the situation are those in the classified advertising departments of the metropolitan newspapers. Even the employment agencies are unhappy. They get plenty of job requests for all kinds of help, more, in fact, than they can handle, but it's a long time between good applicants.

As an industrial psychologist and one who has done a good deal of work in personnel selection, I am frequently asked, "Why bother using tests, applications, or other personnel selection devices when we're glad enough to get almost anybody for the job, as long as he is alive?"

At first glance, this looks like a tough question to answer. Really it isn't. There are three good reasons why, even in the tightest labor market, the use of sound personnel selection at all levels and for whatever jobs they are applicable makes good sense and good economics. But they all require looking ahead a little bit.

Keep Standards Adequate

First, hiring bodies instead of selecting personnel frequently leads to unwarranted lowering of standards. Getting a "sad sack" off the payroll once you have hired him is getting increasingly difficult. It seems to me ironic that any individual can walk off a job as his will or fancy dictates; but, too often, once an employee has survived an altogether too short probationary period (which few managements have the courage to use effectively) it takes almost a major revolution to remove him from the payroll.

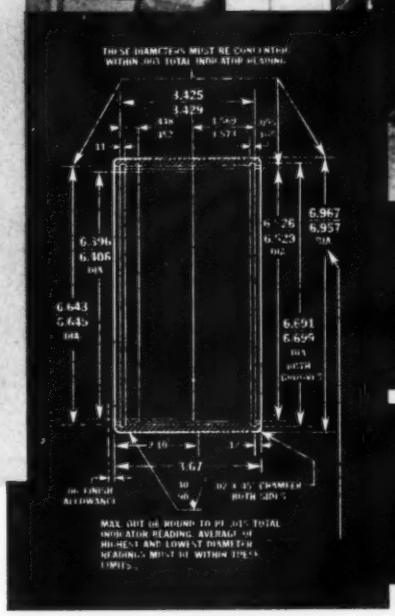
. . . Continued on Page 48

Automobile Manufacturer produces

Repetitive Pieces to Close Tolerances with

BULLARD MULT-AU-MATIC Type "L"

At one of the nation's largest automotive plants, a number of Bullard Mult-Au-Matics, Type "L" are employed to produce automatic transmission parts. According to the Process Engineer "The transmission is the most precision piece of equipment in the entire car — with many moving parts fabricated to close tolerances."



If you have need to manufacture to exacting tolerances it will pay you to investigate the many advantages offered by Bullard Mult-Au-Matic, Type "L".

Send for catalog today

THE
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COMPANY
BRIDGEPORT 9, CONNECTICUT

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286 CANFIELD AVENUE — BRIDGEPORT 9, CONNECTICUT
Please send me a copy of the
NEW MULT-AU-MATIC, TYPE "L" CATALOG

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CITY _____ ZONE _____ STATE _____

CIRCLE INFORM-A-GRAM KEY NO. 47

for —greater confidence in gaging results
—continuous uniformity of production
—lower gage costs per piece inspected

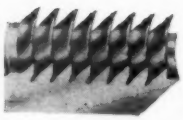
get BESLY METRO GAGES

Quality-Built to

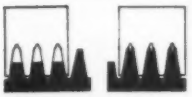
STAY ACCURATE LONGER

Micro-Lapped Finish
keeps gages accurate longer by reducing wear. No sharp "hills" and "valleys" to wear quickly and reduce gage accuracy.

Extra Clearance
at root of ring gages permits wear correction.



Truncated Thread Form



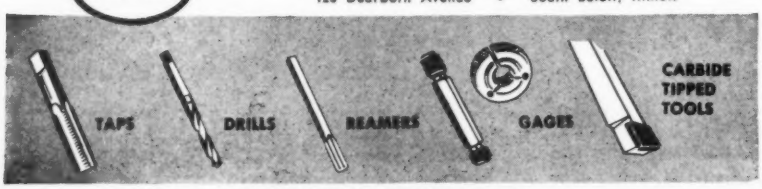
of thread plug at no extra cost. Enables accurate setting and permits easy check for gage wear.

Convolution of First Full Thread
on thread plug and ring gages removes sharp scoring edges and prevents chipping. Also makes Besly-Metro Gages easier to use.

Stress-Relieved
during manufacture by "deep-freezing" to normalize and relieve stresses and strains.

Lapped and Inspected at 68°F.
in air conditioned room which duplicates Bureau of Standards requirements.

BESLY **BESLY-WELLES** CORPORATION
Est. as C. M. Besly & Co., 1875
128 Dearborn Avenue • South Beloit, Illinois



CIRCLE INFORM-A-GRAM KEY NO. 48

. . . "Why Bother" from Page 46

In a tight labor market many a company has hired in haste and repented at leisure. When we're hurrying for production and machines are standing idle and unmanned, it takes real intestinal fortitude to maintain employment standards. I hate to think how much the phrase "he's not what we want, but he's better than nothing" has cost American business over the past ten years. To keep a machine down for a week or two while you search for someone who can learn to operate it profitably is costly. But to keep a machine operating at half or less of capacity for several years because in desperation you lowered your operating standards, is even more expensive. It's sometimes better to sweat out a vacancy for awhile than to hire anyone.

Sound personnel selection, even the soundest, is not infallible; but, it can establish and maintain standards that make long range economic sense. They constitute a barricade against the pressures which too often cause us to relax our standards beyond the point that the circumstances require or good business practices justify.

Selection standards must be adjusted upward or downward from time to time, to meet the demands of an ever-changing labor market. But such changes should be made knowingly, deliberately, and in a manner which will operate to afford the company the maximum productivity that can be achieved at any given time. Haphazard hiring and selection through desperation obviously frequently does more harm than good.

Promotable Potential

Secondly, in many businesses, promotion from within is not only a matter of policy, but one of necessity. Naturally, no one wants a shop full of Horatio Algers. And it is as unwise to staff an organization with an overabundance of ambitious and overqualified employees as to do the reverse. Too often, however, in hiring at the hourly level we do not look ahead far enough to feed into the organization people who have supervisory potential. Sometimes I think too many organizations have swung with the pendulum to excessive college recruiting to fill jobs that could be much better handled by bright high school graduates with a couple of years of shop experience.

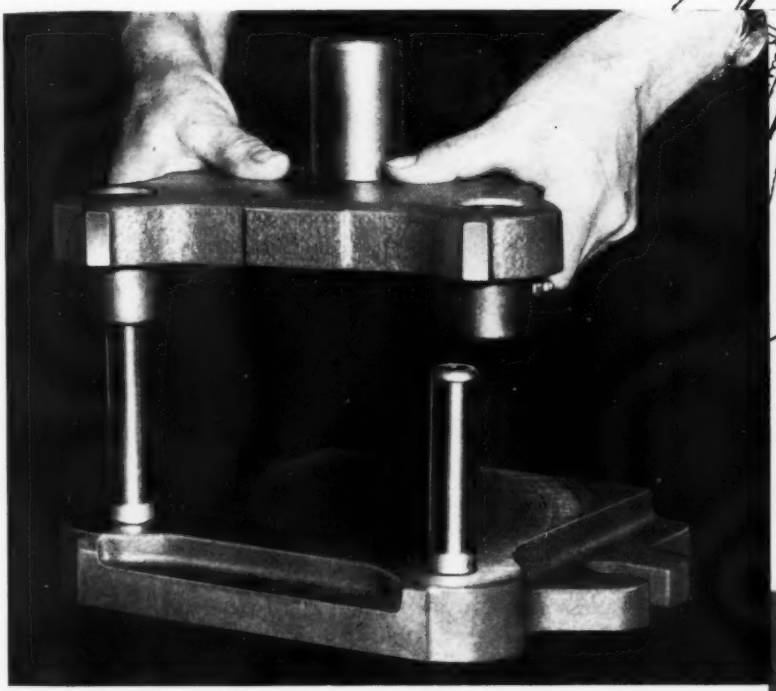
We seem to forget that about 40% of high school graduates who are capable of successfully completing college work do not, for one reason or another, go on with their education. Many of these with a couple of years of shop experience and possibly some carefully selected evening courses would be as well or better qualified for the jobs for which many of us are now engaging in expensive

. . . *Continued on Page 50*

NEW

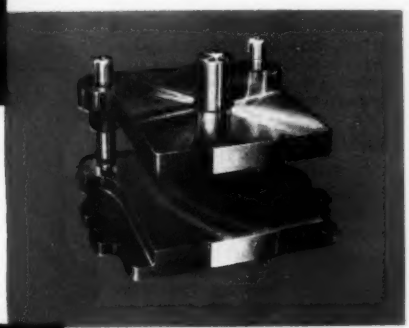
Easy Punch Holder Removal

ON NEW DANLY DIE SETS



Danly's leadership in die set design is seen in another improvement . . . easier removal of punch holders. On ordinary sets, punch holders often bind near the top of the guide posts as they are being removed. Standard Danly Die Sets are assembled with one post a half-inch shorter than the length specified . . . thus, the punch holder swings free before binding can occur. Isn't this another important reason why you should specify die sets from Danly?

complete new
"leadership line" catalog
More than 200 pages provide you with complete design information, easier selection of die sets and supplies.
Write for your copy today!



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DANLY

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PRECISION...
UNIFORMITY...
FLEXIBILITY...

Mark 1000 or more units per hour on an infinite variety of surfaces, flat, round or curved—with absolute uniformity of depth of impression throughout longest production runs.

...PARKER #710 makes marking a production line operation

TYPICAL CASE HISTORIES

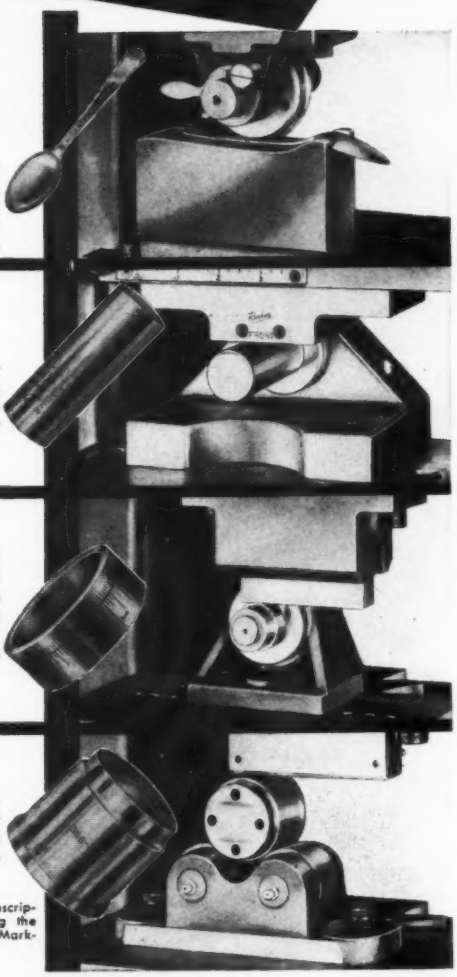
MARKING SPOONS
Using Parker #100 "standard" insert roll die holder and interchangeable segment type. The machine table's "cushioning" effect, plus proper set-up, compensated for the curvature of the spoon.

CAPACITOR SHELLS
800-1000 marked pieces per hour on thin walled aluminum shells with Parker tooling, custom built for use on the Parker #710.

GRADUATED COLLARS
Using a standard Parker stud arbor, the precision graduations were easily indented in this steel collar. Depth of mark was close ly held to specified tolerances.

SOLID ROUNDS
Marking part numbers and other legends on the outer diameter of solid rounds is no problem. Standard Parker roller bearing cradles are used on this production run.

SEND TODAY for new descriptive literature describing the Parker #710 Hydraulic Marking Machine.



THE PARKER STAMP WORKS, INC.
MARKING DIE & MACHINERY DIV.
FRANKLIN AVENUE • HARTFORD, CONNECTICUT
by Parker

CIRCLE INFORM-A-GRAM KEY NO. 50

. . . "Why Bother?" from Page 48

college recruiting. But the ordinary employment office interview is not too effective in identifying people with the characteristics we are seeking. For this, the best psychological selecting devices available are needed, and could be profitably used.

The Long-Range View

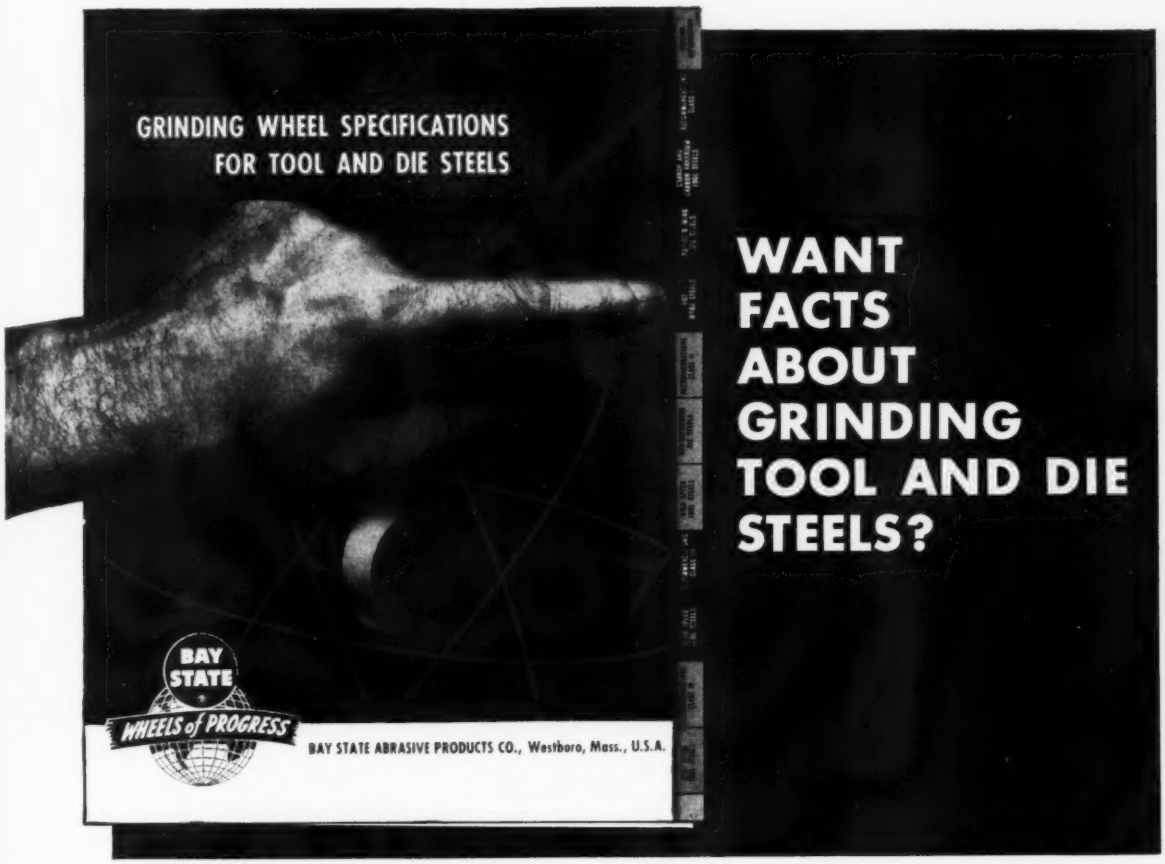
The third justification for using personnel selecting devices in a paid labor market may at first glance seem "longhair." In reality it is the soundest and most economized way to ensure better personnel selection. But to those of us interested in the development of a real **science** of personnel selection based on sound research, it is important.

In many situations, judgments with respect to personnel actions have to be made on a "seat of the pants" basis. No sounder way of doing it exists, and no sounder way will **ever** exist until management is ready to underwrite and support the research needed to provide the answers to personnel selection problems. But doing this research is like mending a leak in the roof. You can't do it when it is raining. You don't do it when the sun is shining. Personnel selection devices are obviously most useful in a free labor market. From a technical point of view, the research necessary to perfect those devices so that the widest possible range of talent can be tried on the job is best done when selection standards are at their lowest.

In some cases tests, application forms, special interviews and other selection devices are administered experimentally but not used in selection. After a period, performances on the experimental procedures are compared with job performance. Through this means it is possible to determine how much selection could be improved through the use of such devices. When the research has been completed management is in possession of the reformation which will enable it to really improve its selection in the future.

No, the existence of a tight labor market should not be taken as an excuse for sloppy selection techniques, or, the surrender of standards. Rather, it is in a tight labor market that we need the protection of sound selection devices and in which we have an opportunity to do the research that will better prepare us to meet the demands of tomorrow's problems.

Revere welded steel tubing can now be obtained in sizes up to 5" O.D. and in wall thicknesses from 0.065" to 0.250", according to an announcement by Revere Copper and Brass Inc.


GRINDING WHEEL SPECIFICATIONS
FOR TOOL AND DIE STEELS
BAY STATE
WHEELS of PROGRESS
BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass., U.S.A.
WANT FACTS ABOUT GRINDING TOOL AND DIE STEELS?

BAY STATE gives you these facts arranged for ready reference, in this new visible-index form. You can quickly locate the types of steel you use, and the recommended specification for grinding each.

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CIRCLE INFORM-A-GRAM KEY NO. 51

For an investment of less than $200. in Bellows Air Equipment—

LOOK WHAT HAPPENED!

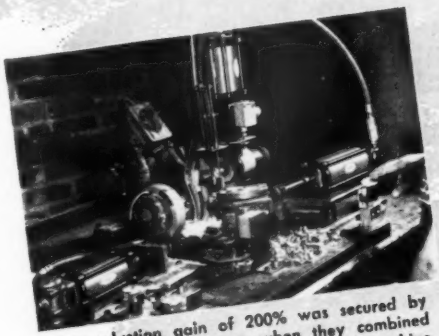
At the Formaid Co., makers of fine brassieres, Bellows Air Motors pre-crease interlining material, doing the job even better than a 5-ton punch press—with big reductions in spoilage, longer tool life, less set-up and much less down time.

Temple-Stuart Co., furniture manufacturers, teamed up two Bellows Air Motors and a Hydro-check for better than a 30% production gain in chucking wooden spindles, and as the operator put it—"at the end of eight hours I'm not tired at all."

Without heavy capital investment, substantial cost savings are being made in many operations with Bellows Air Motors and Bellows "packaged" work units: tool feeds, work feeders, holding devices.

These versatile units are being used to quickly convert standard machines to semi-automatic or automatic operation; or as basic components around which to build inexpensive special purpose machines.

More than 125 full-time Bellows Field Engineers (one or more in every major industrial area in the United States and Canada) are at your call to help your production men work out effective and low cost ways to use "Controlled-Air-Power."



A production gain of 200% was secured by Eastman Manufacturing when they combined three Bellows Air Motors in a special machine to mill and drill bakelite breaker arms. This set-up is one of 25 Bellows installations in the Eastman Plant.

Write today for these interesting free bulletins

Whatever you make, Bulletins ML-3 and BM-25 will make worth while reading for you and every member of your production staff. Address Dept. TP-1056.

Drilling a fly wheel counterweight is being done at R. C. Phelon Co. three times as fast with a Bellows Drill Press Feed and Air Vise as it could be done by hand. And the unskilled operator works with minimum fatigue.

The Bellows Co.

AKRON 9, OHIO

In Canada:

Bellows Pneumatic Devices of Canada, Ltd., Toronto, Ontario

620B-1

CIRCLE INFORM-A-GRAM KEY NO. 52

MODERN FEDERAL DIAL FEEDS have what it takes!

No. 7 Dial Feed
Capacity, 80 tons

VERSATILITY plus AUTOMATION

What's the job? Drawing... staking ...forming... piercing... stamping... crimping... punching... broaching ...burring... assembling? Maybe in your plant it's all of them, or a different, unique operation.

We'll lay two-to-one that Federal Dial Feeds are just what your operation needs. For the possibilities of this press with special jigging are practically unlimited. Add automatic feed and ejection and you have the answer to many cost problems.

Modernize now with Federals and eliminate the need for expensive, specialized equipment. Rugged, precision-built Federals embody the finest materials and workmanship. Available in sizes from 6 to 80 tons. *Write for new Dial Feed Catalog.*

THE FEDERAL PRESS COMPANY
613 Division Street, Elkhart, Indiana

FEDERAL DIAL FEED PRESSES

31 Years' Experience in Dial Feed Engineering and Construction

MANUFACTURING MEMOS

Mission in Sweden Reports . . .

● Reports from a five-man trade mission in Sweden indicate widespread interest in trade with the United States. The mission has been visiting principal industrial and commercial cities in southern and central Sweden in advance of the opening of St. Erik's Fair in Stockholm in which the U. S. government is participating.

Name Changes . . .

● Godwin Gage Co. is the new name of Standard Thread Gage Co.

● The name of General Electric's Trumbull Components Department has been changed to the Circuit Protective Devices Department. This designation is the most descriptive of the kinds of products that this department manufactures for low-voltage electrical distribution systems.

New Graduate Course . . .

● Among the 151 graduate courses being offered by Stevens Institute of Technology is a new one leading to a Master of Science degree in computers. This course prepares scientists, mathematicians and engineers for the design, operation, selection and programming of computing devices of all descriptions.

● The National Board of Fire Underwriters reports that manufacturing building fires increased 11¾% last year over 1954. However, the variation in 1955 from the five-year average shows a decrease of 2½%.

● The Air Force Air Materiel Command has announced a change in its contract with Kearney and Trecker Corp. The contract change provides for the conversion of 22 milling machines being manufactured for the Air Force by the company from a template control to a numerical-type control. Fifty-five additional template controlled, contour and profile milling machines now under contract will also be converted. The Air Force already has 48 skin mills that are automatically controlled.

● Impact extrusions are being produced by the newly-organized company, Impact Extrusions, Inc. of Valparaiso, Ind., headed by Nolan E. McDonald, president and general manager. Aluminum components for the automotive, appliance and aircraft industries are among the first products turned out.

Induction Motors Corp. has acquired PSP Engineering & Mfg. Co. of Los Angeles, largest maker of aircraft solenoids in the West. The West Coast firm will be operated as a wholly-owned subsidiary known as the PSP Division. Induction Motors is a leading designer and manufacturer of sub-fractional horsepower motors.

◆

In order to meet an estimated 150% increase in Yale industrial lift truck sales in California and the West during the next 10 years, The Yale & Towne Mfg. Co. is constructing a factory sales and service branch in Los Angeles. This branch is the initial step in the company's expansion of its sales and service facilities.

◆

The Yonkers research and laboratory facilities of the Schwarzkopf Development Corp., formerly American Electro Metal Corp., have been acquired by Firth Sterling Inc. The facilities will be operated as the American Electro Metal Division.

◆

A new engineering firm, Godderz Engineering Co., has been formed in Minneapolis by D. L. Godderz and H. G. Miller. The new company will provide a general tool and engineering design service to industry in the Middle West. It will also specialize in tooling for multiple spindle machines and the design of special multiple spindle machines.

◆

The water swivel department of Wheel Trueing Tool Co. has been made a division of the firm. The Water Swivel Division produces and markets Truco diamond drilling machines, water swivels, drills and diamond bits.

◆

Industrial distributors placed orders for production supplies and equipment with their manufacturing suppliers at a slightly lower rate in July than in the five preceding months. This fact was brought out in the latest New Order Index compiled by the American Supply & Machinery Manufacturers' Association. While the volume of orders placed by industrial distributors has been declining for the past several months, the level is still well above the volume during any month in 1955.

THIS PROPOSAL CAN SAVE *YOU* REAL *MONEY*

Reports on capital investment savings on the purchase of Portage 4" spindle Horizontal Boring, Drilling and Milling Machines have been as much as 20%. In addition, the initial saving is only part of the story. When you consider operating expense vs. capital investment . . actual dollars saved are even greater than the initial 20%.

It will pay *you*..in more ways than one..to get a proposal from Portage before making a final buying decision.

Write for the Portage No. 4 catalog.

THE Portage MACHINE CO.

1046 Sweitzer Avenue • Akron 11, Ohio

Representatives in Principal Cities

BUILDERS OF PRECISION MACHINE TOOLS, SPECIAL AND PRODUCTION MACHINERY SINCE 1916

CIRCLE INFORM-A-GRAM KEY NO. 55

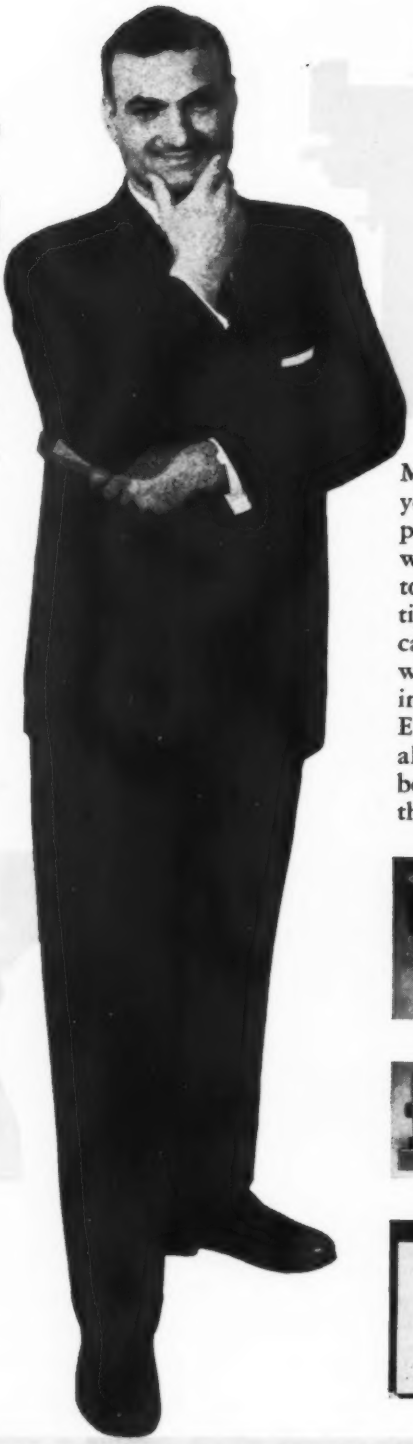
my name is

Ping Ianitelli

in charge of our

"Prove It"

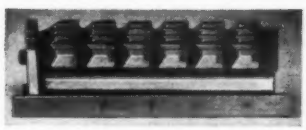
division at elox



My division will actually machine parts for you. Not just a single sample, but enough production runs to provide a true evaluation of what Elox Electrical Discharge Machine tools can do in your plant. Tungsten Carbide tipped single point tools, forging dies, die casting dies and Tungsten Carbide form tools will be machined at a cost we guarantee impossible to duplicate except with Elox E.D.M. I've been able to prove to hundreds of alert concerns that these jobs can be done better, faster and less expensively with Elox than by any other method.

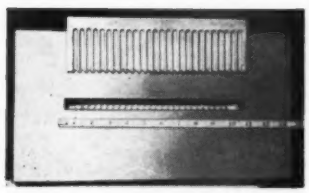
WE SAVED 19 MINUTES

grinding this single point tungsten carbide tip boring tool.



WE SAVED 16 HOURS

plus 9 different operations on this form grinding of a carbide broach.



WE SAVED 379 HOURS

on the machining of this die casting die.

WHATEVER IT'S COSTING YOU NOW... CHECK WITH ELOX

elox* corporation of michigan

1834 STEVENSON HWY. ROYAL OAK 3, MICH.

*T.M. Reg.

CIRCLE INFORM-A-GRAM KEY NO. 56

Will You Be There?

Oct. 8-12. American Society for Metals. Metal Show. Public Auditorium, Cleveland.

•

Oct. 8-10. American Society of Mechanical Engineers. Lubrication Conference. Atlantic City, N. J.

•

Oct. 9-10. Armour Research Foundation. Third Annual Computer Applications Symposium. Morrison Hotel, Chicago.

•

Oct. 10-11. The Material Handling Institute, Inc. Fall Meeting. The Traymore Hotel, Atlantic City, N. J.

•

Oct. 17-19. American Society of Body Engineers, Inc. 11th Annual Technical Convention. Rackham Memorial Building, Detroit, Mich.

•

Oct. 18-19. The Institute of Management Sciences. Third Annual International Meeting. Statler Hotel, Los Angeles, Calif.

•

Oct. 18-19. Illinois Institute of Technology. National Conference on Industrial Hydraulics. Sherman Hotel, Chicago, Ill.

•

Oct. 22-26. National Safety Council. National Safety Congress and Exposition. Conrad Hilton, Congress, Morrison and LaSalle Hotels, Chicago, Ill.

•

Oct. 21-24. Society of Industrial Packaging and Materials Handling Engineers. Annual Protective Packaging and Materials Handling Exposition. Kiel Auditorium, St. Louis, Mo.

•

Oct. 22-26. National Industrial Exposition & Management Conferences. Detroit Artillery Armory, Detroit, Mich.

•

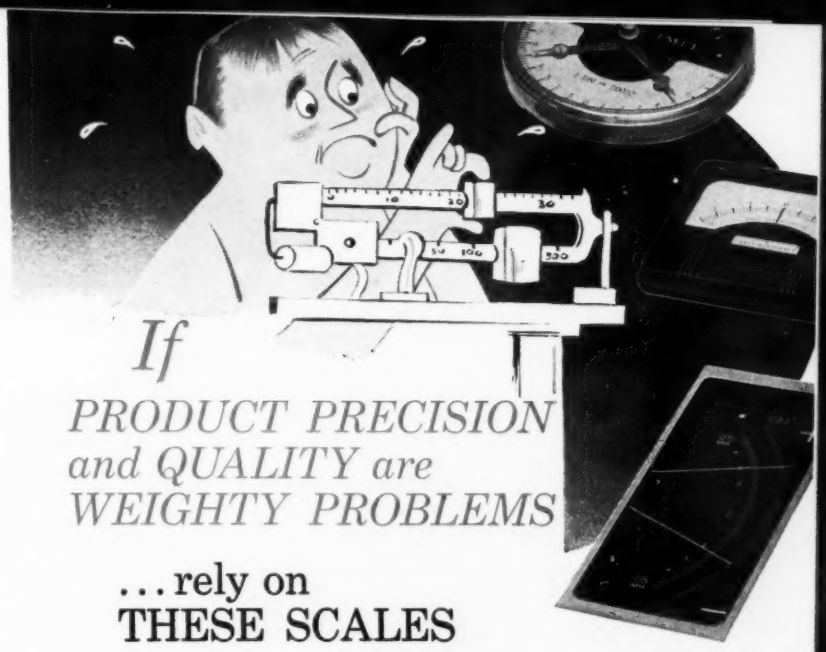
Oct. 28-31. American Gear Manufacturers Association. Semi-Annual Meeting. Edgewater Beach Hotel, Chicago, Ill.

•

Oct. 31-Nov. 2. Industrial Management Society. Twentieth Anniversary Time and Motion Study and Management Clinic. Hotel Sherman, Chicago.

•

Nov. 2-3. Illinois Institute of Technology, Illinois Chapters of American Society of Tool Engineers, Northwestern and Illinois Universities. Sixth Annual Tool Engineering Conference. Illinois Tech Campus, Chicago.



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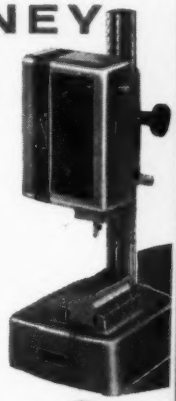
Inexpensive high precision. Require no outside power source. Combine the simplicity of mechanical operation with high magnification (to 5000X). Easily portable. For external gaging applications.



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Wherever the ultimate in gaging accuracy is required. Combine mechanical gaging with electrical magnification for easy reading of errors in "tenths" or "hundredths." Magnifications to 110,000X.

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outlining your Quality Control Requirements.

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MACHINE TOOLS • GAGES • CUTTING TOOLS

it takes top cutter design to get best cutter performance!

BARBER-COLMAN offers

Special Form Development

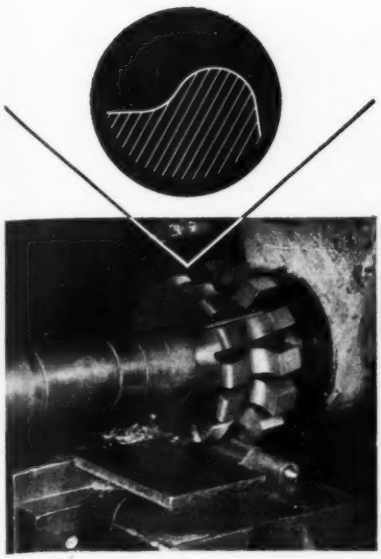
Special form-relieved cutters often allow several operations to be combined into one. Barber-Colman Engineers are experts in designing special tooth forms on form-relieved cutters for solving specific milling problems.

Our cutting tool division has the complete engineering, manufacturing and inspection facilities for making specially-designed form-relieved cutting tools of the finest quality. In addition to designing special forms, our engineers will design into the cutter such special features as axial side clearance, rake angles and helical flutes in any combination to produce maximum cutting efficiency. The best high-speed steel for the specific material to be cut is specified by our experienced engineering staff.

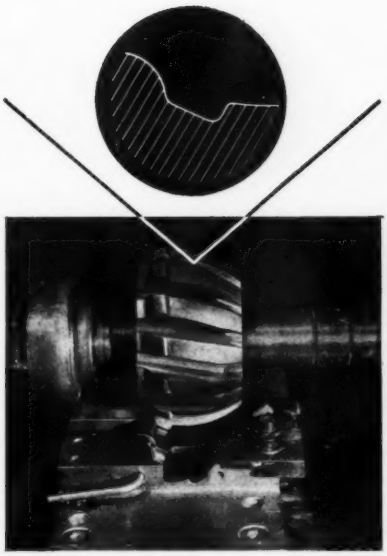
Barber-Colman form-relieved cutters require no "spot sharpening". Accurate face sharpening will maintain the correct form for the life of the cutter. This is true on all cutters including those with axial relief, rake or helical flutes.

Application of Axial Relief

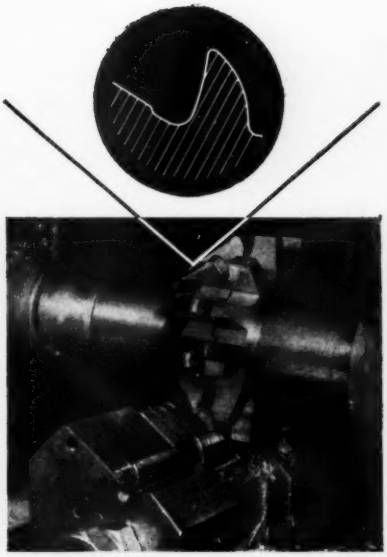
Surfaces which are in a plane perpendicular to the axis of the cutter, or nearly perpendicular, cannot be milled with a form-relieved cutter unless the cutter teeth are provided with axial side clearance. Barber-Colman can solve this problem by making the cutter with axial relief in one or both directions so that several cuts can be combined into a single milling operation. These applications show the proper use of axial clearance and helical flutes.



The form on this part has one side which is nearly perpendicular to the axis of the cutter, requiring a cutter with axial relief as well as radial relief. Both the axial and radial relief are formed onto the cutter tooth at the same time, and they are both applied to the complete tooth form. Consequently, the faces of the teeth can be sharpened without changing the tooth form. Helical flutes are provided to produce a shearing cut for improved finish and cutter life.



The form on this cutter is provided with both radial and axial relief because one small section of the form is nearly perpendicular to the cutter axis. Without axial relief, the perpendicular portion of the form would wear rapidly because of insufficient clearance. However, since the entire form has ample clearance behind the cutting edge, cutter life is greatly improved. Helical flutes eliminate any chatter during the cutting operation.



The workpiece in this application is tipped at an angle so that there is no undercut portion in relation to the axis of the cutter. However, in its cutting position, both sides of the form are nearly perpendicular to the cutter axis. The cutter is a two-piece interlocking type with axial relief in one direction on one side of the form, and in the other direction on the other side of the form. As the cutter is sharpened the form spreads apart, but the correct shape of the form is maintained. The proper dimensional relationship between the form is maintained by simply grinding the spacer between the two sections to the proper thickness.

These are only a few examples of the many special cutter problems passing through our Engineering Department daily. We welcome the opportunity to work with you in solving your production problems, and we invite you to send us part prints. Get top cutting efficiency through top cutter design.

BARBER-COLMAN COMPANY

81010 ROCK STREET • ROCKFORD, ILLINOIS

Hobs • Cutters • Reamers • Hobbing Machines • Hob Sharpening Machines

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CIRCLE INFORM-A-GRAM KEY NO. 59

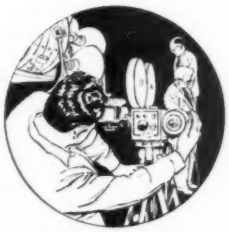
MULTIPLE SPINDLES... SAVE TIME; CUT COSTS!

Illustration shows Twin Spindle Gorton Duplicator profiling 15 blades on two impeller rings of stainless steel alloy from a single blade master.

Multiple Milling Heads Multiply Output!

Gorton Twin Spindle Duplicators — manually controlled (shown above) or up to 6 Spindles hydraulically controlled, boost individual machine productivity.

A wide range of spindle speeds — up to 12,000 R.P.M. . . . for either high speed steel or carbide cutters. Gorton Super-Speed Vertical Mills and Duplicators are ideal for vertical milling, inside or outside profiling, die sinking, mold cutting, counterboring, chamfering, grooving and for general duplicating in ferrous and non-ferrous metals as well as plastics. Work pieces may be flat, cylindrical, spherical, square, uniformly curved or irregular in shape. Standard models or custom designed — Gorton Tracer controlled Duplicators fill many present day needs for more production at lower costs.



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- 10 Models Super-Speed Vertical Mills.
- 7 Models quickly convertible for Duplicating or Milling.
- Horsepower from ½ to 15.
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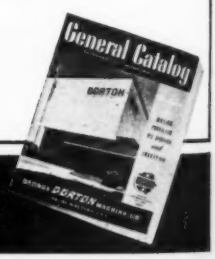

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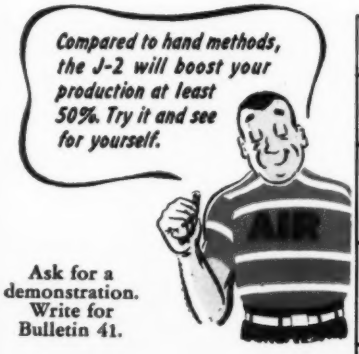

Ask for a demonstration. Write for Bulletin 41.

SPECIFICATIONS

MODELS	Blows per Minute	Length	Weight	Square Drive*	Side to Center	Hose Connection	Rated Capacity. (Bolt Size)
J-2-S Side Handle	2100	6″	3#	½″	1⅛″	¼″	¼″
J-2-L Lever Handle	2100	7¾″	3¼#	½″	1⅛″	¼″	¼″

*⅜″ square drive or 7/16″ Quick-Change Chuck is optional.

CIRCLE INFORM-A-GRAM KEY NO. 61

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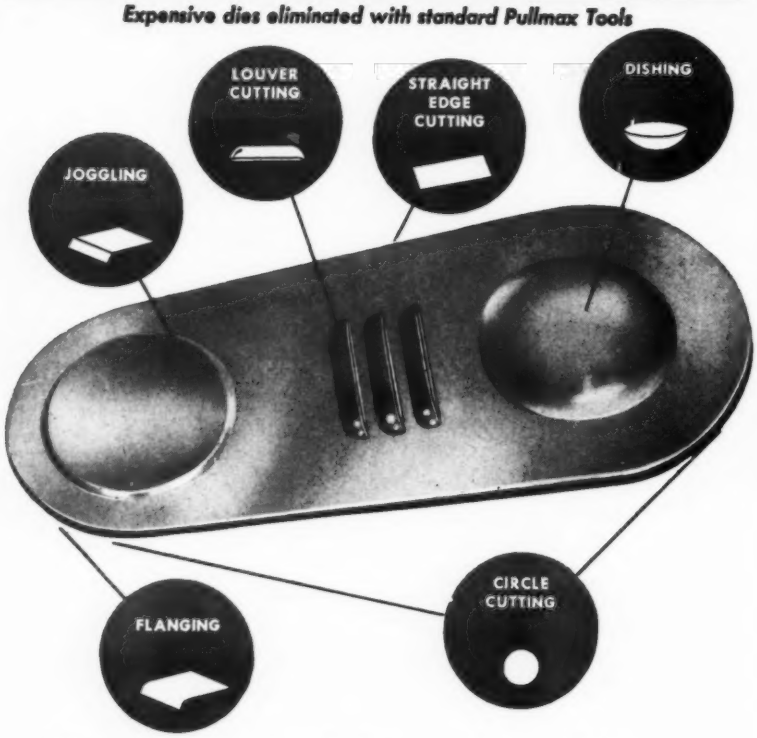
Expensive dies eliminated with standard Pullmax Tools



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This one versatile machine does straight shearing, inside or outside circle cutting, design cutting, inside square cutting, beading, joggling, slot cutting, louver cutting, dishing, edge bending and flanging.

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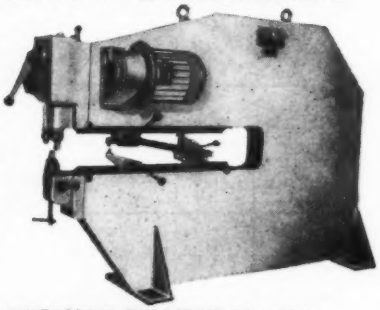

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See us at the Metal Show in Cleveland, October 8-12, Booth 2521.

GROWING PAINS

Boice Gages, Inc. has announced the construction of a new plant at Hyde Park, N. Y. The structure will permit the company to triple present production while providing space for further expansion.

◆

Vanadium-Alloys Steel Company is undertaking an expansion program that will approximately double the capacity of its entire plant. The Latrobe, Pa., mill is exclusively devoted to the production of high speed steel. Plans call for the extension of existing buildings adding 52,000 sq ft of space to the structures housing the rolling mills and hammer and melting shops. The expansion program will include the installation of new 10", 12" and 16" rolling mills plus all the necessary equipment for their operation.

◆

A new wind tunnel capable of developing air speeds up to 125 mph is being built by **Ford Motor Company.** It will be part of the company's Research and Engineering Center at Dearborn, Mich. The wind tunnel will show some of the effects high-speed driving will have on cars and trucks. From the test results, the engineering department will be able to develop more efficient aerodynamic shapes, better seals and quieter interiors. The project will be completed late next summer.

◆

Stanat Manufacturing Company, Inc. is building a single-story ultra-modern plant in Westbury, L. I., N. Y. The structure, which will be completed this year, will include manufacturing areas as well as engineering and administrative offices. The company designs and produces rolling mills, slitting lines and related metal processing equipment.

◆

The Cadillac Motor Car Division of **General Motors Corporation** has purchased the former Hudson Motor Car plant in Detroit. The 1,000,000 sq ft of floor space added by the purchase will be used primarily for the division's sheet metal fabrication operations. The plant will be modernized before new machines and equipment are moved in for the Cadillac operations.

◆

Wesson Multicut Company is erecting a new plant in Brighton, Mich., to take care of increasing demands for its special tools in automated industries.

Tool Steel Clinic on Two Feet

YOUR MILNE SALES-ENGINEER

Your local Milne man is a tool steel specialist, trained to help you solve your tool material problems. He's an expert in tool steel characteristics and applications who can help specify exactly the right steel for the job.

He represents MILNE, America's Leading Tool Steel Specialists. That means he has a tremendous range of grades, sizes, shapes and finishes of tool steel to draw upon, including many unusual ones that are hard to find elsewhere.

Milne has grown up in the tool steel business. Its CONCENTRATION and SPECIALIZATION on this field is reflected in the variety of its warehouse stocks and the special knowledge in the minds of its representatives.

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Includes several newly developed Milne tool steels

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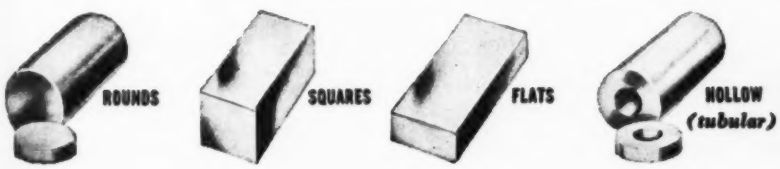

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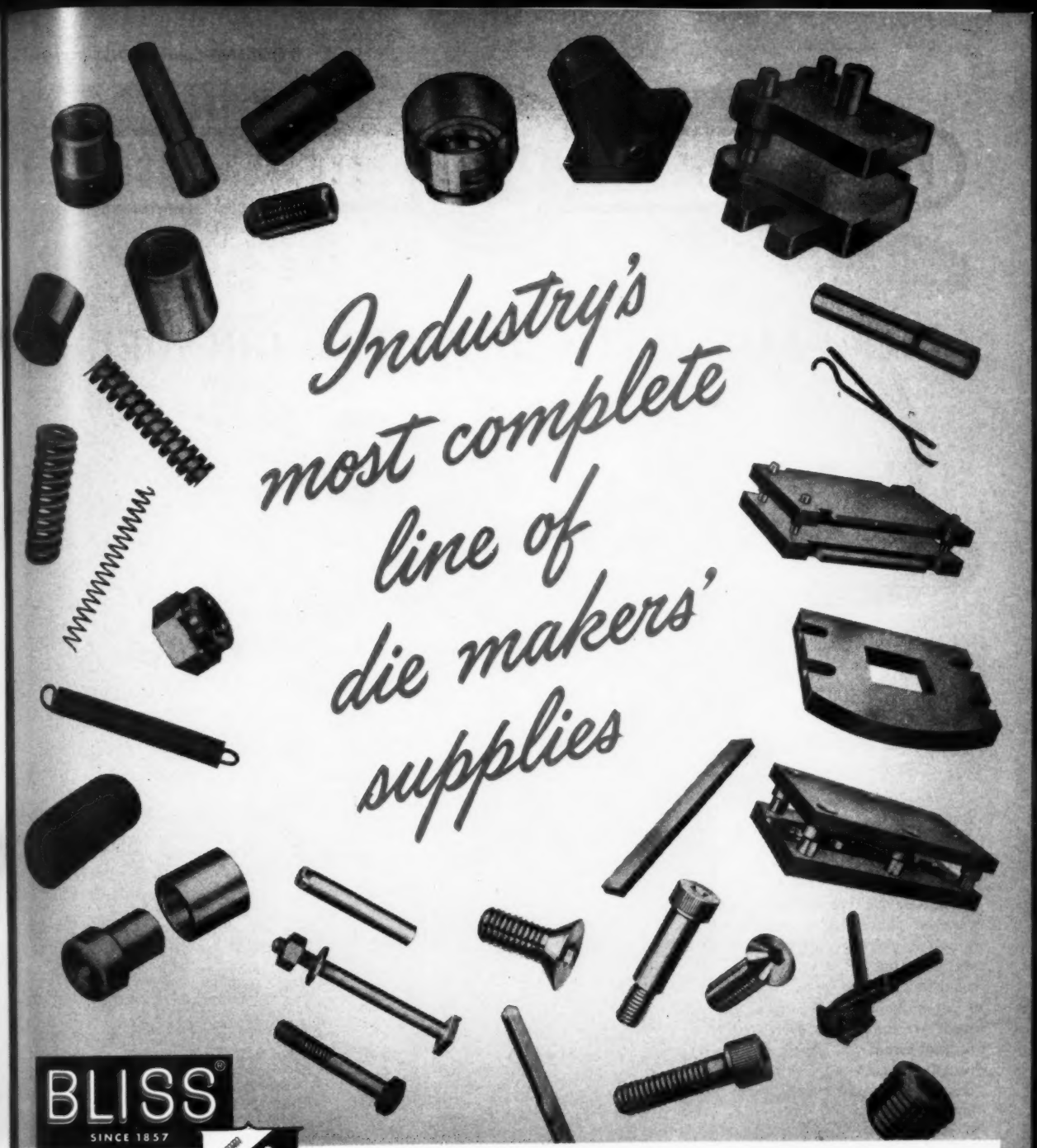

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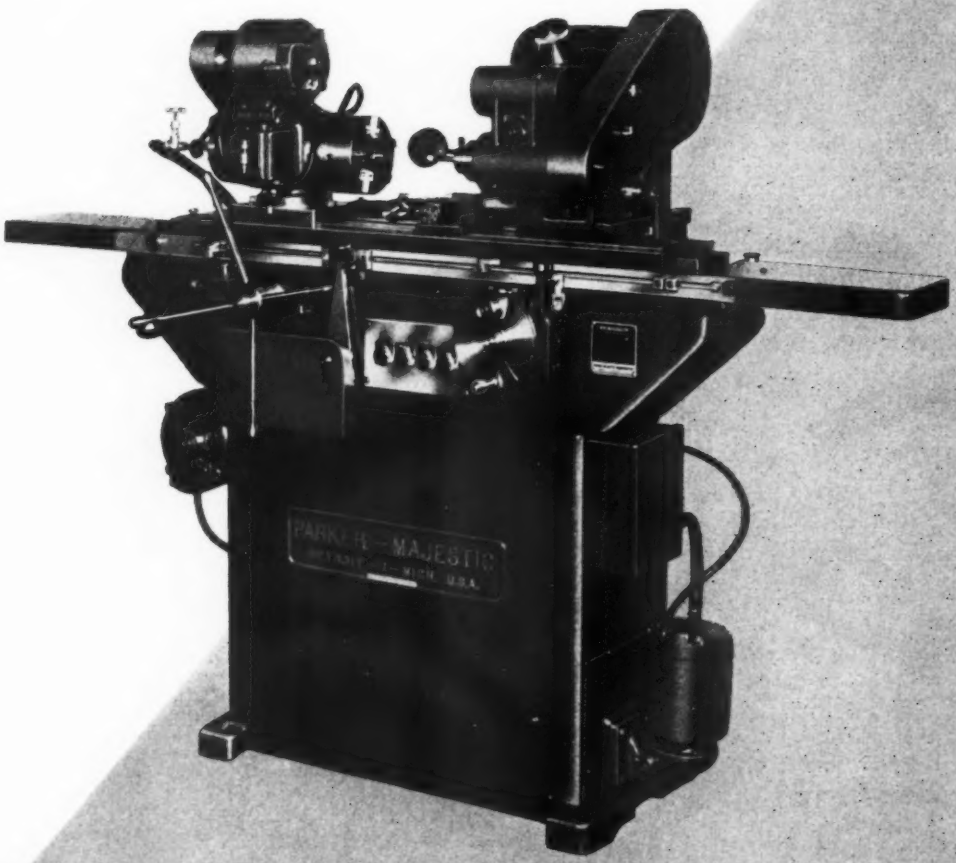

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—Henry R. Hanson, president, American Machine Tool Distributors' Association, at the NMTBA Sales Conference.

". . . we must seek out the boys and girls of exceptional talent and see that they receive the encouragement and assistance they need, for they are the nation's future intellectual leaders without whom we will have no intellectual future—possibly no future at all!"

—Dr. L. A. DuBridge, president, California Institute of Technology, in a talk, "Educating Engineers," at San Bernardino Valley College.

". . . if we hope for progress there is no substitute for productivity at lower cost — and you can't get that kind of productivity without providing industry the tools needed to achieve it."

—Louis Polk, president of the National Machine Tool Builders Association and The Sheffield Corporation, at the recent NMTBA Sales Conference.

"Aluminum usage in the United States continues showing the rapid growth that has characterized the industry for the past several years. . . . this trend will continue and . . . by 1965 the United States will be using aluminum at twice the present rate — more than four million tons of aluminum a year."

—Henry J. Kaiser, chairman of the board and president, Kaiser Aluminum & Chemical Corporation, in a recent report to stockholders.

"The most important contribution that the Federal Government can make to the economic health of small businesses is . . . to pursue monetary, fiscal, and housekeeping policies that foster sustained expansion of aggregate economic activity and that avoid the illusions of well-being that are sometimes produced by price inflation."

—From the Progress Report by the Cabinet Committee on Small Business, Aug. 7, 1956.

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Includes complete table of specifications and capacities for six press sizes. Also covers accessory equipment such as straighteners, feeders, scrap winders, etc.

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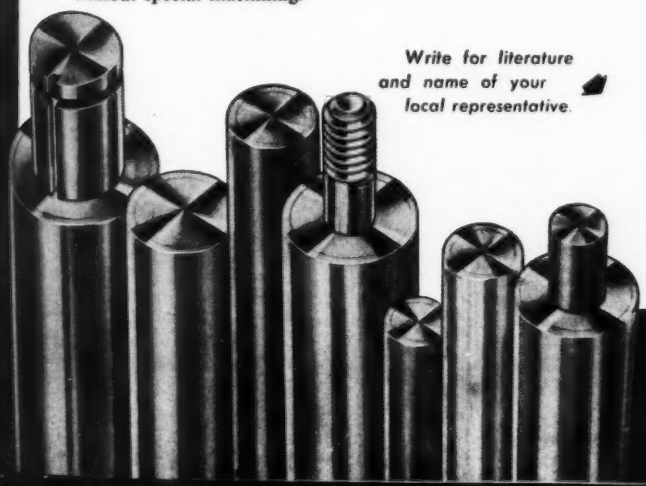

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A wide range of standard and custom-engineered microwave components and complex mechanical assemblies are available from J-V-M Engineering Co., Brookfield, Ill. They can be supplied on a pilot run or production quantity basis. Microwave components ranging from dc to 40,000 mc include cavities, adapters, bends, attenuators, loads, tees, twists, directional couplers, etc. Tools, dies, general machining, screw machine and sheet metal are covered by the mechanical components and services.

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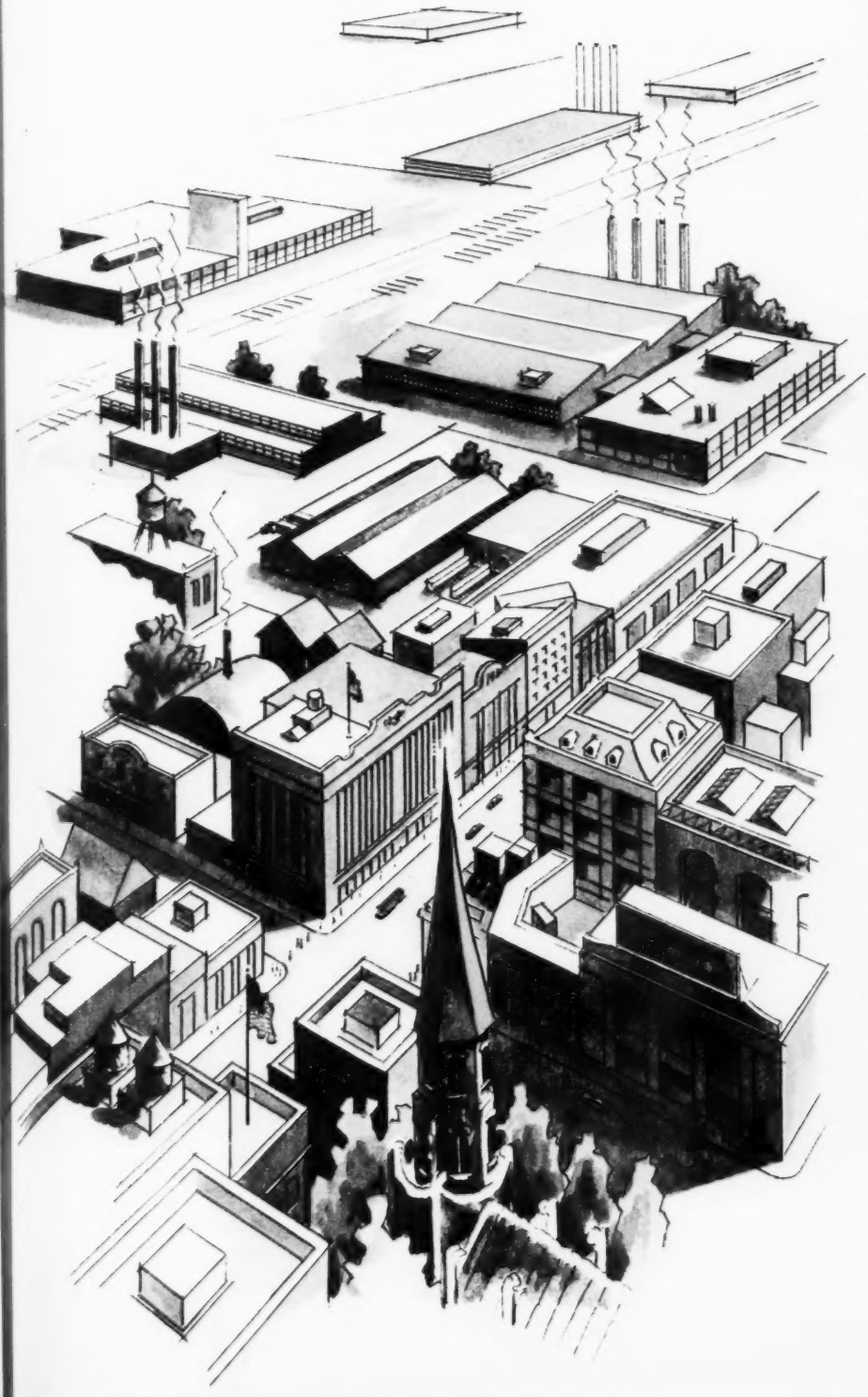

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Industry and the Communit

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Our distributors . . . and countless others like them . . . form an invaluable link in the chain of America's economic system. Because of them and their business establishments we, as a manufacturer of end mills, have throughout the country: warehouses, display rooms and local inventories from which our products can be sold and quickly delivered to industry.

Because of the nature of their business they must be men of diversity . . . have wide knowledge of many things. Putnam distributor personnel are familiar with many tools and their applications in manufacturing processes. Into the bargain they must be salesmen, bookkeepers, market analysts, tax and labor experts, etc.

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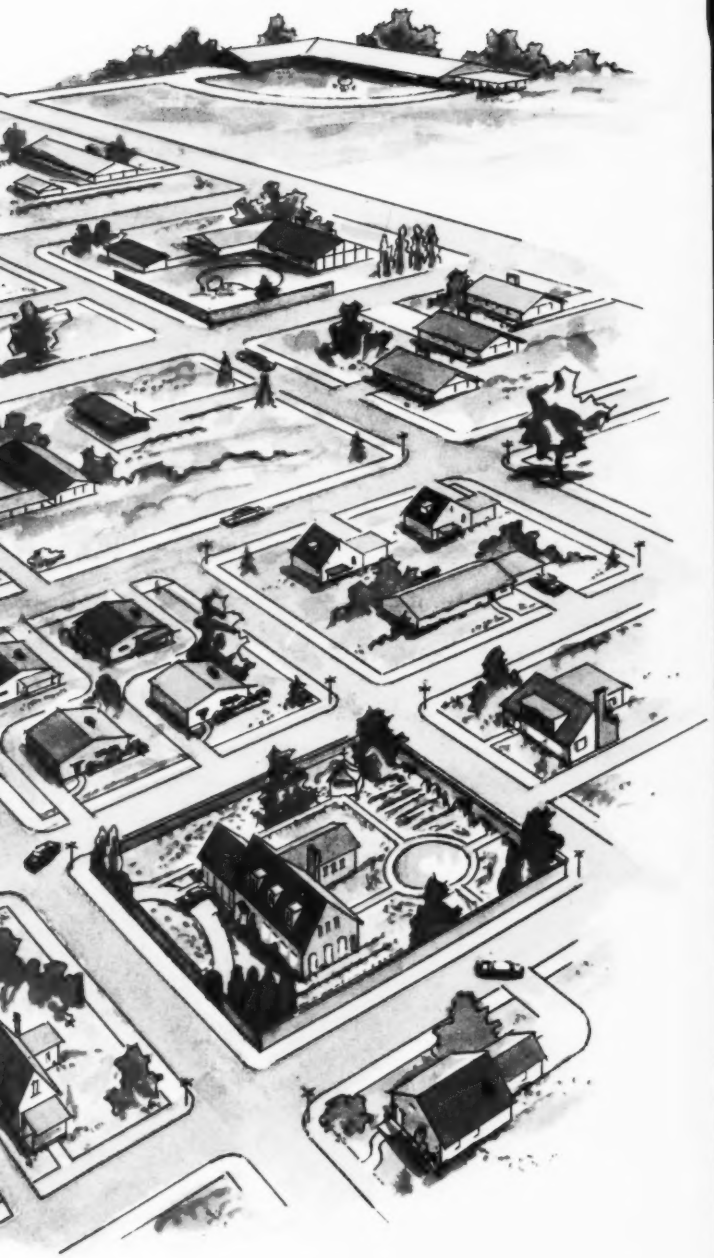

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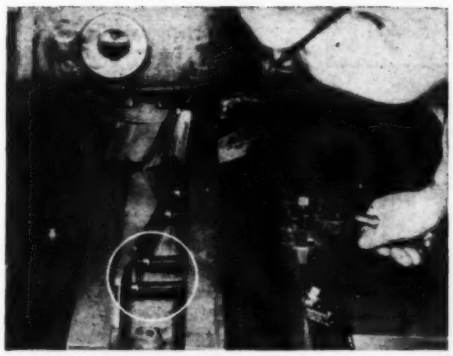
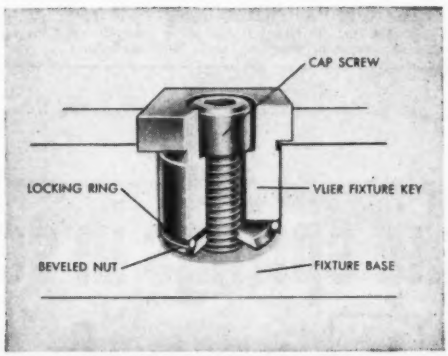
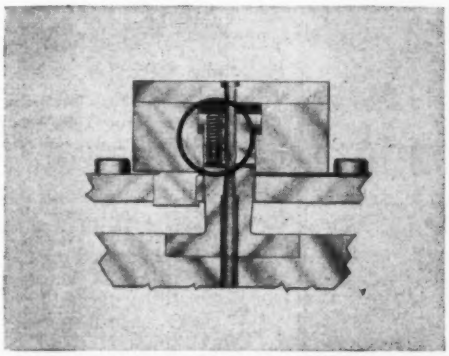


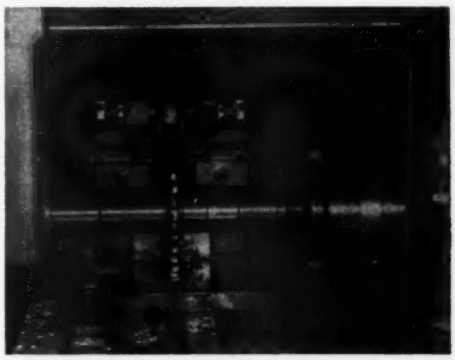
CLAMPING OFF-ANGLE PARTS in jigs and fixtures is a cinch with Vlier Swivel-Pad Clamps. Pad swivels on a ball, 7½° each side of center line. Can't bind or damage part surface. Socket set models can be inserted from either end.



NEW FIXTURE KEY WITH INSTANT-ACTING, INTEGRAL LOCK eliminates unnecessary drilling and tapping operations to mount keys in fixture base. Holds key securely, permits quick change of key size for different table slots. Insures perfect alignment of jigs and fixtures on table.



NEED ACCURATE, UNIFORM SPRING LOADS? Vlier Spring Plungers really pay off when positioning parts in jigs and fixtures. Spring loads are accurately set at the factory; stay constant. Plunger telescopes completely.



THE RIGHT AMOUNT OF CLAMPING PRESSURE AND NO MORE! There's no distortion of the part when Vlier Torque Thumb Screws are used to clamp it in the jig or fixture. Once predetermined end pressure is reached, the head turns freely. Working parts are protected from foreign matter.

Where can your tool room save?

Chances are, you can think of dozens of uses for standard Vlier Tooling Specialties—applications where expensive, complicated, home-made devices are now being used. *Why not write for your copy of the new 1956 Vlier catalog today?*

Originators of small parts that make a big difference in tooling costs!

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CIRCLE INFORM-A-GRAM KEY NO. 77

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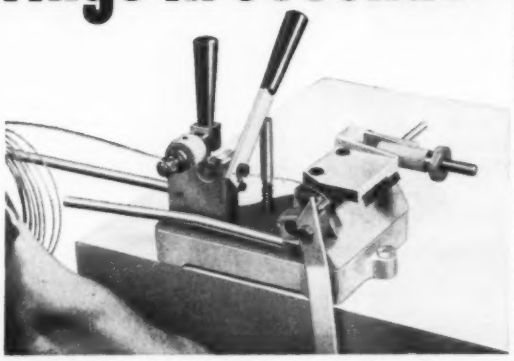
PUBLICATION PREVIEWS 178
Capsule description of current literature. Bulletins, brochures, catalogues and circulars — You name it.

SHOP AIDS 226
Need help in any aspect of modern metalworking? See this section for materials and design aids, inspection and production techniques.

PROGRESS ON PARADE 228
Check this carefully. It can bring new efficiency to your operation. The newest in machines, tools, and accessories.

Make springs in seconds!

Save costly special orders WITH THE NEW



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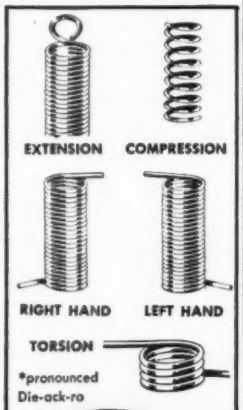

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CIRCLE INFORM-A-GRAM KEY NO. 78

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— FEATURES —

TALK OF THE MONTH: "Some Mechanization Problems for Management" by James R. Bright, Harvard University 8

Problems facing management in automated plants are not appreciated by many people. Mr. Bright sights a number of examples to demonstrate some of the limiting factors in the use of automation production.

LABOR MARKET: "Why Bother" by Dr. Erwin K. Taylor, Industrial Psychologist 46

Because the labor market is tight, Dr. Taylor urges that care should be exercised in the lowering of standards for hiring plant personnel.

STAMPINGS: "Thousands of Parts Tell The Stamping Story" by Carol E. Reuss, Associate Editor 82

This resume of the actual and potential use of stampings defines clearly the importance of the stamping industry in our economy.

PRESS SETUPS: "Methods of Reducing Press Setup Time" by Howard A. Nieberding, American Stamping Co. 85

Standardization of presses for setups, tool and die design, proper die cataloging, and well organized die storage are the principal factors in a successful program for reducing press setup time.

DIEMAKING: "Common Sense Die Making" by Ernest J. Urbas, The Guarantee Specialty Mfg. Co. 89

A progressive die of unusual design is presented by Mr. Urbas, in which he points out some radical departures from conventional die making practice.

BENDING DIES: "How to Achieve Positive Stock Retention In Bending Dies" by W. M. Halliday, Southport, England 93

Bending unsymmetrical workpieces creates pulling forces that tend to shift the piece in the die nest. Several die design features are given to insure that the work "stays put" during the bending stroke.

Editorial Index

AIR POWER: "Pneumatic Circuits — an Easy, Quick Way to their Understanding and their Use" by William E. Hoffman, Associate Editor 98

Practical problems in building pneumatic circuits are presented with instructions to the reader how to solve them. It is suggested the reader solve these problems and then compare his answers with those given.

BARREL TUMBLING: "Barrels Tumble $30,000 From Stampings Finishing Costs" by Kenneth D. Higgins, Underwood Corporation 103

Employing modern barrel finishing equipment, deburring and polishing costs have been reduced as much as 90% on one part. Mr. Higgins relates how Underwood modernized their barrel finishing system.

DIE CUSHIONS: "Progress in the Development of Die Cushions" by D. A. Rogers, Dayton Rogers Manufacturing Co. 107

Die cushions have gone through a period of evolution similar to most other devices, until it has evolved to its present state to meet the needs of the industry it serves.

PRESS LINE: "Conveyorized Press Line Ups Hub Cap Production" by Herbert Chase, M. E. 132

Partial automation, conveyors, manual handling, five presses, and three operators produce hub caps at an unusually high rate.

GAGES: "Keep Track of Your Gages (and your Customers)" 202

A gage numbering system for marking each shop-owned and customer-owned gage is not adequate for complete gage control. The author has devised a system of gage control which he presents.

PUNCH PRESSES: "Are You Getting the Most Out of Your Punch Press" by E. V. Weyler, Walsh Press & Die Company 224

Advantages in the use of open back inclinable punch presses are presented by the author and he points out that it is possible to perform 75% of all stamping operations on this type press.

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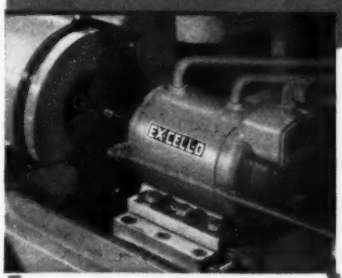

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GEORGE J. HUEBNER

1885 - 1956

Founder, President and Friend

"This above all: to thine own self be true,
And it must follow, as the night the day
Thou canst not then be false to any man."

With the sudden passing, on August 28, 1956, of George J. Huebner, it was brought home to us how fully the life he led embodied the credo expressed in the above, his favorite quotation from Shakespeare.

He could not "be false to any man." He was dedicated to service — to his beloved family, his church, and to his personal and business friends.

To his publishing business he brought the concept of service with which he was so thoroughly imbued. Fortified by a thorough grounding in selling, finance, and metalworking, he was bound to succeed.

In building his business, from a dining room table-top office to what *Tooling & Production* is today, he never lost sight of his ideals in human relations.

He knew, from extensive experience in trade association work, as National Code Authority for the tool making industries, and from 26 months of War Production Board service as Director of Tooling Procurement, that people work better with than for. His ability to stimulate thinking and to bring about meetings-of-the-minds sparked any group effort into consistent progress toward constructive objectives.

Along the way, much recognition was accorded George Huebner by the Metalworking Industry for his leadership, organizational ability and technical know-how.

His eminent success as one of the initiators of the Automotive Tool & Die Manufacturers Association of his native Detroit, led to his appointment and move to Cleveland as Executive Secretary of the Special Tool, Die & Machine Shop Institute, of which the automotive group was a part. With the invalidation of the NRA, which had been the reason-in-being for the Institute, he was a prime mover in the gathering together of regional tool and die shop trade groups into the National Tool & Die Manufacturers Association. In recognition of his efforts in behalf of the NTDMA he was made the only honorary life member.

Consistent with George Huebner's philosophy of service and loyalty to the industry in which he played such a great part, apprentice training was one of his greatest enthusiasms. To him, tool and die making was a profession, clothed in dignity and made up of truly superior and rewarding skills — skills acquired only by long study and practice. He overlooked no opportunities, either in person or through his editorial efforts, to further the initiation and expansion of apprentice training.

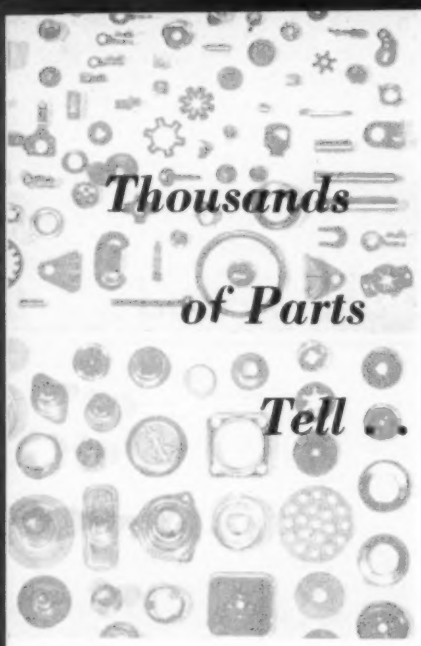
Those of us who have served as publishing and editorial apprentices under George Huebner have had a rich and inspiring experience. He was never too busy to lend a kind and sympathetic ear to the personal problems of any. He offered constructive advice when it was sought, and respected our idiosyncrasies. We worked with George Huebner, not for him.

He has left us a great deal to work toward, however, in maintaining the traditions he established and in attaining the goals he was always setting, higher and higher, for *Tooling & Production*. Being beneficiaries of his true leadership will make our jobs ever so much easier.

In accepting an Honorary Award of Merit from the Tool and Die Institute of Chicago, October, 1944, he said,

"For myself I have decided that the fulfillment of good intentions builds strength, be it business, industry, or government. In my own business, therefore, I expect to operate on the basis of the greatest good to the greatest number. For me it is a satisfying formula."

The Staff
Huebner Publications, Inc.



THE STAMPING STORY

by Carol E. Reuss
Associate Editor

FROM PIN-HEAD-SIZE electronic computer components to garage-door-size boxcar ends . . . from 100,000 pieces per pound of metal to one piece per hundred pounds. This is the gigantic range of parts being produced in this country's stamping plants.

The contract stamping industry, second only to the automotive industry as the nation's largest consumer of sheet and strip steel, specializes in producing component parts rather than finished goods. Its presses supply hundreds or hundreds-of-thousands of identical, precise, formed parts to manufacturers of industrial and consumer goods alike.

Actual and potential uses for stampings are practically infinite. One glance around the office, the home or the shop furnishes tangible evidence of the industry's importance and magnitude. Furniture, appliances, business machines, instruments, production machinery, toys, transportation equipment, farm machinery — all manufactured products — utilize stampings.

Of the $200-billion worth of goods and services which industry sells to industry each year, the Pressed Metal Institute estimates that over $4-billion worth is in job stampings.

PMI market studies indicate that demands on the contract stampers for more high-quality pressed metal products are steadily growing. Increasing orders for all types of manufactured goods; new products, processes and equipment; and the increasing importance of lower production costs are some of the current and future demands on stampers.

Reports from steel industry observers predicting a rapid growth in light sheet production are additional barometers of the stamping industry's future activity.

To keep up with the quantity demands alone, Harold A. Daschner, PMI executive secretary, warns that "stampers will be going backward instead of forward unless they increase their facilities by approximately one-fourth in the next three years."

Stampings "Grow Up"

Stampings are not new. More than 50 years ago presses pounded out pots and pans from sheet metal stock. Later, automobile fenders took shape in presses, then automobile body sections, appliance parts and an almost unbelievable number of similar and dissimilar items. With the growth of metal stamping, the wooden ice box and the cast iron range were transformed into lighter, stronger, more attractive and functionally better home appliances.

Until World War II, little technical data on stamping techniques and advantages was available to designers. Seldom were parts designed and specified as stampings. Instead, designs for forgings and castings were utilized. Mass production of quality stampings was a matter of chance and the individual stamper's experience.

When wartime shortages demanded conservation of raw materials, it became apparent to the stamping industry's leaders that the economies and advantages of stampings could

be realized most fully by designing parts especially as stampings. These men met with government agencies to suggest design and production methods and to prove how time, men and machines, in addition to scarce materials, could be saved by utilizing stamping procedures and adequately designed stamped parts whenever possible.

These industrial leaders have worked consistently ever since to refine and extend stamping techniques and applications and to promote the versatility and economy of press-working.

The most immediate results of their labors were embodied in wartime military goods. The conversion of the ball retainer section of a military tank to a simple formed stamping, from a machined cast bronze unit, saved over 400,000 lbs of bronze. Redesign of the .30 calibre ammunition box reduced storage and transportation requirements by 32%. Redesign of the .50 calibre box resulted in saving enough steel in each million boxes manufactured to produce one-half million .30 calibre boxes.

The 29 operations necessary for forging a trigger cover plate were reduced to seven when the part was produced as a stamping. Mass production stamping applied to a previously forged bomb lug made available thousands of bombs and, on 100,000 units, saved 17,000 lbs of steel and 8,000 machine-tool hours.

Same Methods, Modernized

Advocates of stampings have long known that presses are capable of producing considerable quantities of identical pieces each time a run is made. Experience and research projects have aided them in developing more precise techniques.

For example, stampers predetermine accurately the amount of stock necessary for forming parts. They help parts designers avoid expensive second operations. In addition, they punch holes in even the thinnest metals without tearing, and they hold critical tolerances to 0.005″ and finer.

Today, large stampings, such as those formed for washing machine tubs, are drawn from blanks mechanically fed at 1/16″ accuracy. In contrast, minute radio and camera parts are stamped from coils of strip stock less than ¼″ wide and with piece dimensions held to 0.0001″.

Stampers today blank, bend, form, draw, coin, trim, punch, cold extrude and finish materials ranging from tin foil to strip 0.56″ thick and on up to plate steel 3½″ thick. Copper, brass, aluminum, magnesium, soft steels, hard tungsten and carbide alloys, plastics, the "wonder metals"—titanium and zirconium, and combinations of these materials are shaped into usable parts in their presses.

Basic stamping principles have not changed since the "pots and pans" era. Additional and advanced techniques and applications, however, have evolved through the years.

Current Achievements

Instead of using several presses to produce a part of complex shape, stampers now utilize multi-operation or progressive dies when more than one operation is essential to the production of complicated parts. In some instances, secondary operations are eliminated entirely with advanced part designs.

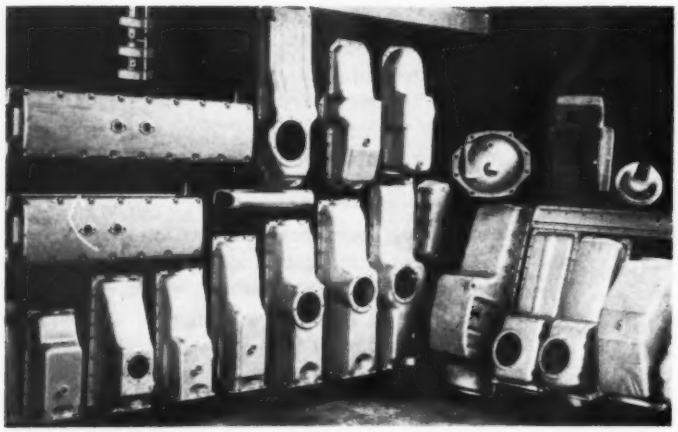
By "ganging" operations in a press, multi-operation work is accomplished by moving the stock from one station to another, rather than from one machine to another or from one department to another.

These same techniques and capacities which save machine time also save valuable man-hours in stamping plants. A single operator, with an automatic stock feed at his press, can turn out thousands and thousands of pieces a day. A single operator with a progressive die can accomplish several operations with each press stroke, to produce 30,000 to 50,000 pieces a day.

What have these advances within the industry accomplished? Orders for all types of precision stampings, large and small, have in-

SOME HINTS
for stamping economy

- Mark close tolerances on specifications only when they are absolutely and actually necessary.
- Study part requirements and available materials carefully and choose the stamping stock which will most economically satisfy part requirements.
- Use lighter gauge stock whenever possible.
- Specify burr removal only when such finish is absolutely necessary. (If smooth surface is sufficient, specify tumbling instead.)
- Predetermine your needs. (Cheaper tooling can be used for limited runs. Best prices can be obtained by ordering maximum quantities.)
- Let the stamper decide on the most efficient sequence of operations.
- Tell the stamper how the part is to be used. (His knowledge of comparable parts and applications can often lead to valuable money-saving suggestions.)



As stamping techniques have advanced, parts designers have specified innumerable new uses for stampings in all types of manufactured products. The large deep drawn parts shown in this illustration are important components of automobiles, trucks, farm implements and business machines.

Courtesy of Transue & Williams Steel Forging Corp.

creased significantly as stamping facilities and know-how have progressed. The number of stamped parts in almost all finished manufactured items has likewise grown larger.

Numerous successful redesign projects have been undertaken in an effort to convert components to stampings. For example:

- Multi-dimension rocker arm assemblies, formerly forged, are now being produced by stampers with resultant savings in weight, production time and money. Neither strength nor durability has been sacrificed.
- Ball bearing races are now made adequately and economically by stamping methods.
- Contrary to previously held production theories, stampers now produce minute pin holes in stock ⅛" thick, while holding close tolerances on both hole accuracy and location.
- In printed circuit production, where accuracy is essential to maintaining electrical contact within the extremely fine circuit patterns, stampers hold critical tolerances while punching dozens of holes for contract plugs and anchoring pins through the combination plastic-metal circuit base.
- The transition to stamped metal cabinets on television sets has facilitated automatic production and assembly, and has resulted in a lower price for T.V. purchasers.
- Contoured automobile body sections and stamped aluminum grilles are additional stamping achievements that have been accepted by the automotive industry and the general public.

Many Hands Make Light Work

Closely allied to the advancements made by contract stampers are those engineering and design improvements undertaken by the manufacturers of stamping presses, dies and auxiliary equipment, and the metal stock producers and suppliers.

Press makers have increased press versatility by designing and building into stamping presses such features as automatic feeds, ejectors and lubricating systems, and safe, flexible and reliable operating controls. More compact and easier to operate and maintain, presses are "custom tailored" to suit any stamping need.

In the stamping die field, stronger die blocks protect expensive tooling during long press runs. More durable tool steels and cemented carbides, and easy-to-use accessories have also helped boost stamping production and lower per-unit costs.

Development of economical short run dies has encouraged short run production by assuring stampers of accurate part production at lower cost. Plastics, cast metals, steel rule dies, template dies and magnetic punches have all contributed to more economical short runs.

Metallurgical research is responsible for the industry's acceptance of new metals and alloys as well as the stamper's knowledge of how to fabricate them.

The multi-million dollar contract stamping industry has earned its high rank and reputation in the nation's industrial picture by its service to industry.

How these specialists in the art of press-working metals meet the demands and challenges to come depends on their continued enthusiasm, their close cooperation with both customers and suppliers, and their eagerness to expand their operations before the need for additional facilities becomes critical. That they will meet these obligations and challenges successfully is indicated by the present dynamic character of the contract stamping industry as a whole.

end

Stamping industry achievements and problems are being discussed at the Pressed Metal Institute's Annual Meeting as many of you read this issue. Key topics for the Sept. 30-Oct. 4 sessions at Pocano Manor, Pa., are Management, Apprentice and Foremen Training. Speakers include Carl Robinson, Barrington Associated, Inc.; Philip R. Marsilius, Producto Machine Co.; and Joseph F. Bacek, Spang-Chalfant Division of National Supply Co.

METHODS OF REDUCING PRESS SETUP TIME

by Howard A. Nieberding
Superintendent
AMERICAN STAMPING COMPANY
Cleveland, Ohio

As Told To Carl F. Benner
Associate Editor

PRESS SETUP TIME is a charge against a stamping job that can be excessive if a definite, smooth running system of die handling has not been established, especially in stamping job shops, where the short run job is the regular operation rather than the exception.

Setting up a die in a press involves more than just the labor of setting the die in the press. In die change-over, the element of press downtime is an important factor.

Therefore to avoid excessive press downtime, some means must be devised to inform

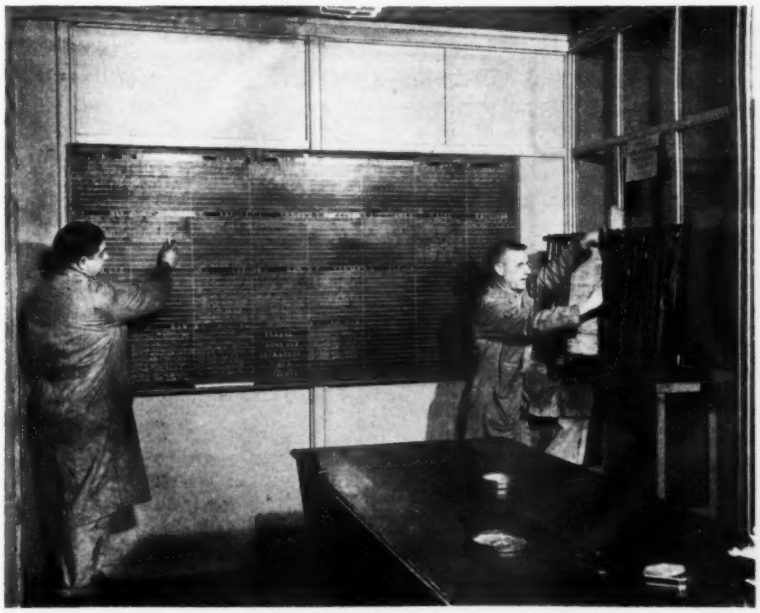


Fig. 1. Work schedules are made daily from a card index prepared by the engineering department. The work to be performed, the die number, die location, and press required for each job are shown on the schedule board.

Fig. 2. Portion of a ram plate showing pattern of equally spaced counterbored bolt holes.

all personnel involved in the operation of the shop just what procedures are to be followed when an order enters the plant.

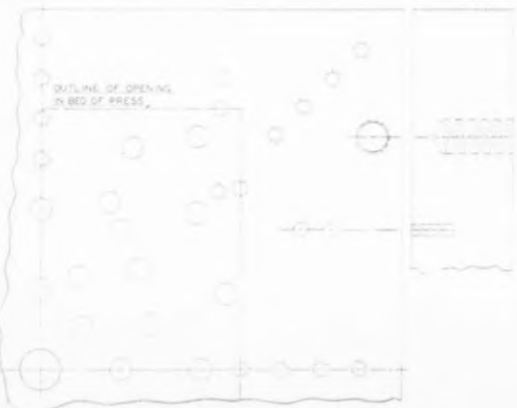
American Stamping Company, over the years, has developed a system of die change-over that has standardized this operation.

The procedure starts in the engineering department where an index card is prepared for each Die-Operation. On this card is given all the information necessary for the shop to schedule the order for production, Figure 1.

All presses at American are classified as to size: BB indicates heavy presses from 600 to 1000 tons; B 190 to 350; C 80 to 150; D 50 to 71; and C 20 to 45.

A chart has been prepared which gives the following information on each press in the plant: Name and type of press; class; press tonnage; cushion tonnage; stroke; strokes per min; die heights with plates; die heights without plates; size of bolster LR × FB; size of slide LR × FB; bolt holes in slide LR × FB; size of slide plate LR × FB; side plate bolt spacing, center to center; adjustment; opening in bed of press LR × FB; thickness of bolster; thickness of punch plates; and serial number of press and remarks.

Fig. 3. Portion of bed plate showing pattern of radially spaced pressure pin holes.



With this information available the shop can readily schedule an order on the best press to do the job.

We at American Stamping know that standardization of presses for setups, tool and die design, proper cataloging, and storage of tools and dies are the principle factors in a successful program for reducing press setup time.

Standardization of presses for setups is accomplished by the use of ram plates (Fig. 2) having equally spaced counterbored bolt holes (spaced on 3″ centers), and by using bed plates (Fig. 3) having radial spaced pressure pin holes located on 3″, 5″, 7″, and 9″ centers and continuing at 2″ intervals up to maximum size of the plate. There is a set of ram and bed plates provided for each press in the shop regardless of press size. For the heavier presses, sets are made up of material thicknesses of 2″, 4″, and 6″. To make these sets more universal in their adaptation, bed plates for presses of 250 tons and under are made up with circular cutouts at the center of the plate. This cutout provides for jobs in which it is desirable for the workpiece to drop through.

To carry the universal adaptation still further, insert plugs (Fig. 4) are provided which fit into the cutouts. These plugs are of two types, those that are equipped with pressure springs and those that have various sized openings for drop-through.

Tool and die design for efficient press setup is a very important factor in reducing setup costs. Tools and dies at American Stamping are designed with setup pins, crash blocks, and filler plates that are used to compensate for die shut-heights on various machines.

On dies that will be run on presses of 250 tons and under, compensation for die shut-heights is designed into the die. This is accomplished in the toolroom by attaching a filler plate of the proper thickness to the bottom of the die. Thus the operator or die setter does not have to spend any time in adjustments for die shut-height.

An example of the use of bed plates in compensation for die shut-height could be found in producing a heavy flat stamping that would require the use of a heavy press. To compensate for any die shut-height discrepancy, bed plates of 2″, 4″, and 6″ thicknesses have been made up for this purpose. Thus, good tool and die design will eliminate the building of bridges and contraptions which are often resorted to in some setups and which are also very costly.

Both punch holders and die plates are designed for drilling and tapping attachment holes in the same hole pattern as found in the ram and bed plates; that is, the four mounting holes provided in the punch holder will match the proper combination of four holes in the ram plate. The same is true of the mounting holes in the die plate and the attachment holes in the bed plate.

Therefore, when a press operator has to make a press setup, he mounts the ram plate onto the punch by inserting four bolts through the four counterbored holes in the ram plate that match the four holes in the punch plate.

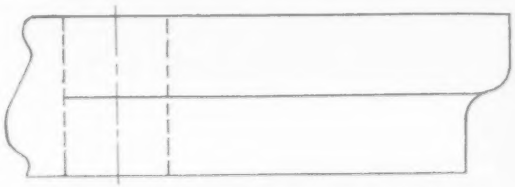


Fig. 4. Portion of insert plug, used in bed plate cut-outs, to adapt the bed plate for a variety of operations.

This assembly of ram plate and punch is then attached to the press ram by four bolts being run through corner holes of the ram plate into the ram.

With the bed plate permanently attached to the bed of the press, the operator's job in setting up the die consists of locating the die on the bed plate. This is done by means of a setup pin which protrudes from the punch and enters a matching hole in the die. Four bolts attach the die to the bed plate.

Diligent cataloging of all dies has contributed materially to reducing die setup costs. Every die built by American Stamping is assigned a number which is cataloged and stamped on the die. In addition every customer's die also receives an American Stamping number for positive identification. In addition to the die numbering system, storage location is standardized.

The storage racks (Fig. 5) for small dies consist of racks lettered from A through K, tiers lettered from A through S, with 9 compartments in each tier. A die stamped for storage reading GH5 would be found in the 7th rack, the 8th tier or shelf, and the 5th compartment. The size of the compartments is such that more than one die can quite often be stored, this depending on the size of the die.

The uprights of these racks consist of tee-shaped members with the stem of the tee facing the aisles. These then form the track on which eight elevator grooved rollers travel. The elevator, designed by American Stamping, is constructed so that two rollers on each corner travel on one of four tracks, two tracks being on either side of the aisles as can be seen in Figure 6.

The roller construction is such that the rollers can be disengaged from any set of four tracks when it is required to move the elevator to a different set of compartments. The elevator in addition to being movable up and down, also travels on suspended rails which run the whole depth of the rack installation. The elevator is powered by an electric hoist.

When an operator is making a change-over, he is given the die number and rack number. If the rack number is GH5, he moves the elevator (Fig. 6) in the aisle between racks G and H to compartment No. 5, engages the elevator grooved wheels, steps on the elevator platform and ascends to tier H, where he finds the desired die, pulls it onto the elevator platform, and descends to a level at which a fork truck picks up the die and transports it to the press on which the run will be made.

Storage racks for the larger dies are built of pipe construction, with racks lettered A to G and tiers lettered from A to G in height with 13 compartments deep.

The supporting surfaces on which the dies rest are raised about 4" off of the rack cross-members. This provides operating space for the fork of the lift when picking up a die.

The elevator used in handling the heavy dies is a moving crane-type life fork, which is built by Louden Machinery Company. It consists of an overhead rolling crane structure which can travel the length of the storage rack bay. An elevator equipped with a horizontal rotating fork mechanism is designed to roll

The American Stamping Company is a 34 year old company which has enjoyed a steady growth in volume of business.

Four years ago the operations were moved into a new modern plant, 320' x 200' with 74,000 sq. ft. of floor space. This is about twice the area occupied in the former location.

The demand for stampings, especially in the truck manufacturing industry, has steadily increased to the point that additional facilities were required. Recently, an additional 10,000 sq. ft. of space was added to house machining, cleaning and painting departments. This brought the plant area up to 84,000 sq ft.

Despite increased capacity and productivity, the backlog of unfilled orders has increased about 25% in the last 12 months.

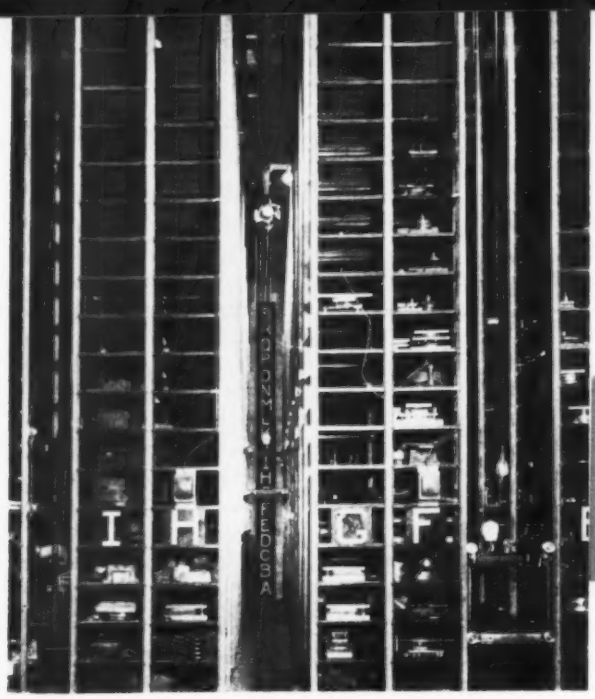


Fig. 5. View of portion of small die storage rack, showing letter marking on the racks, tier location letters, and elevators in several aisles.

back and forth across the width of the bay on the overhead crane structure.

Thus, the elevator in addition to going up and down, can be moved back and forth across the ends of the racks and to and fro through the aisles between the rack tiers.

When a die of a certain number is to be picked up from a specified location, such as CE8, the operator moves the elevator to passageway C, moves to compartment 8, raises the platform to tier E, moves the fork in under and picks up the die, then returns to the front of the rack where a forked truck picks off the die and delivers it to the press on which it is to be run.

This is an operation which requires only a few minutes of time and without much physical effort on the part of the operator.

Methods of reducing setup time at American Stamping are not confined to just the labor of setting a die in the press as can be realized by the supplementary operations just described. This system has made it possible for an operator to make as high as three or four changeovers in one shift.

Thus standardization of press setups, tool and die design, proper cataloging and systematic storage of tools and dies are the principle factors in a successful program of reducing press setup time.

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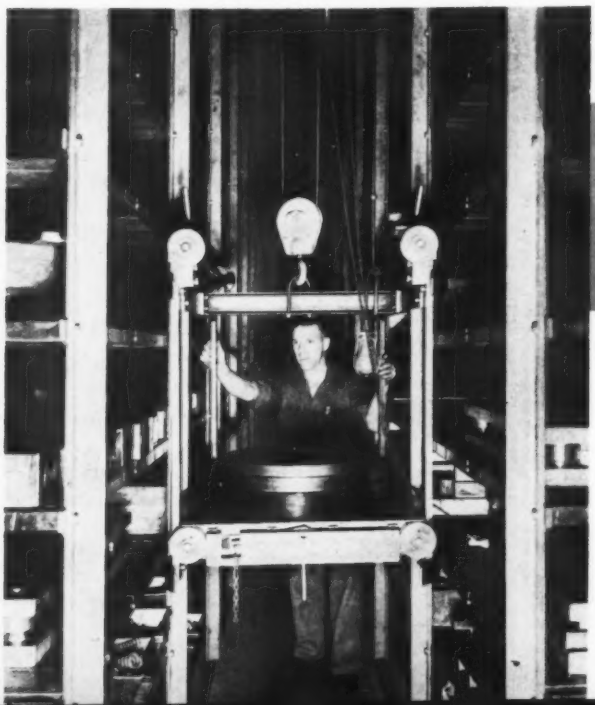
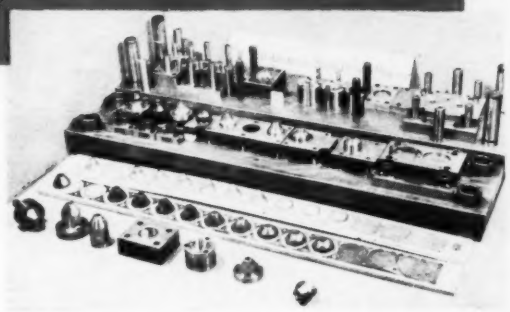


Fig. 6. Close-up of one small die rack elevator showing arrangement of the four grooved rollers installed on each end of the elevator platform.

COMMON SENSE DIE MAKING



by Ernest J. Urbas, Supt. — Tool & Die Dept., THE GUARANTEE SPECIALTY MFG. CO. Cleveland, Ohio

THE PROGRESSIVE DIE described in this article was on display at the recent ASTE show in Chicago. It was displayed through the courtesy of The Guarantee Specialty Mfg. Co., at the booth of the Uddeholm Company of America, makers of fine Swedish tool steels.

This particular die had many features that interested and intrigued the men who spent time to go over the many details. A few of their comments may be worth repeating.

"The design of this die is twenty years ahead of the times" was the comment made by the sales manager of one of the leading eastern progressive die shops.

"The ideas used in the die are so revolutionary that it puts us to shame; we thought we knew something about building dies", was the statement of the president of one of the finest lamination die shops in the country.

All of us are creatures of habit; we do things in the same repetitive manner because we were trained to do them in a particular fashion. Those who trained us have endowed us with good sound working knowledge, but too often we are parroting someone else's idea. Good or bad, we continue the practice without question simply because of the way we were trained.

To follow continuously the practice of what is termed good die making practice can lead to an unconscionable number of hours spent or wasted doing things and making unnecessary parts only because someone taught us that such is good die making practice. What is good die making practice? Is good die making practice a "catch all" phrase, a dumping ground, or an excuse for excessive hours of window dressing instead of creative tooling?

In answer, I would like to point out that a die of the type shown in Figure 1 is not a single purpose tool that produces one product only. The insertion of the change tools in the foreground converts the die for producing the straight edged hexagonal part shown by the nearest progress strip.

Most important is the fact that the tools may be changed in the die without removing the die from the press. Furthermore, a die of this type never becomes obsolete for it can be used over and over, producing different shapes so long as the end product doesn't exceed the area of the cutout or carried blank.

One of the frequently asked questions concerning the die was, "How large are your production runs?" Most of the men were surprised when I told them that the die was used to produce the parts in job lots, the quantity varying from 5,000 to 50,000 pcs per month. These figures include the total of all of the varieties of styles that the die is built to produce.

You may wonder whether these relatively small quantities justify a tool of this type. They most certainly do. First of all, you must remember that we are employing high production techniques whether the volume is small or large. Also, remember that we are trying to produce the largest quantity of stampings in a given month with the fewest number of peo-

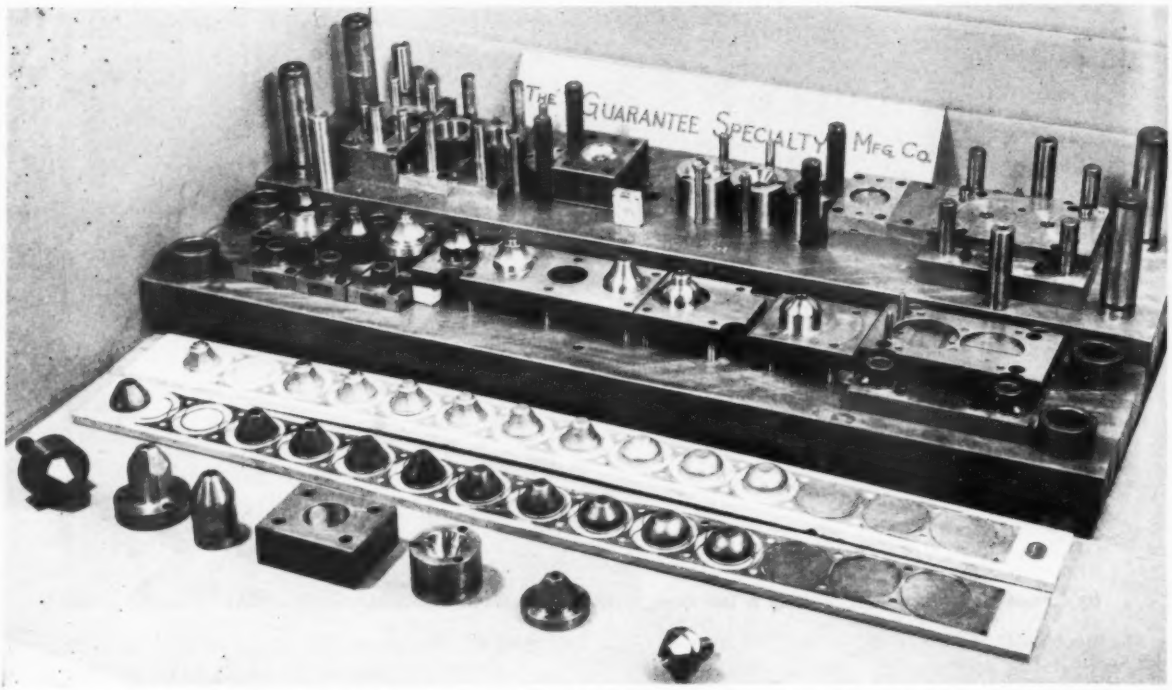


Fig. 1. A "common sense" die with change tooling for producing the two styles of plumbing item seen in the adjacent progress strips. The play-by-play account of the travel of the strip through the die from right to left follows.

Sta. 1. The end of the strips is placed between the round stock guides and moved to a position past the two pilot pierce holes. The first hit produces two pilot holes and the inner cutout. A small portion of the end of the strip will be cut by the second or outer punch; this scrap must be removed.

Sta. 2. The strip is advanced until the two pilot holes are over the pilot station. With the second hit the pilots locate the inner cutout and the outer cutout is made.

Sta. 3. This station is idle. It is included because of the separation between the second cutting station and the first draw station.

Sta. 4. First cupping or draw.

Sta. 5. This is a pilot station; the cup acts as the pilot.

Sta. 6. Second draw.

Sta. 7. Third draw.

Sta. 8. Fourth draw used on hexagonal stamping.

Sta. 9. Strike for hexagonal or octagonal shape.

Sta. 10. Reduces neck on octagonal part.

Sta. 11. Takes change tooling for various hole sizes.

Sta. 12. Takes change tooling for various extrusions.

Sta. 13. Final pinch trim.

ple commensurate with the equipment we have. Let me put it another way, one operator with this die in one press can produce more parts in one day than six operators can produce in three days if the job was run on single operation presses. This part being a standard plumbing replacement item will be in demand for many, many years.

The cutout pattern employed in this die is of the double round (two-leaf clover) design, Figure 2. For a medium size stamping this particular layout of the double round cutout offers the most economical use of material. In this pattern the material width is the same as the diameter of the outer or large cutout. The outer or large cutout punch is relieved or hollowed out so that only two quarter-sections of the punch cut through the material. This is performed in the second station of the die. The inner or small cutout punch cuts almost completely through the material except for two gaps, each approximately $\frac{1}{8}$" wide. The groove cut across the inner punch, Figure 2, prevents the complete cutout. The inner cutout is always made before the outer one to prevent a disturbance or twisting of the web or carriers.

Setting the die in the press is relatively simple. Once the diemaker "times" the individual stations, he mounts stop blocks on the die. Thereafter, the setup man simply adjusts the shut-height to these stop blocks. These stop blocks, as simple as they are, contribute immeasurably to successful repetitive setups.

A die of this type must be provided with a simple method of quick removal and installation of change tools. Remember, these tools are changed without removing the die from the press. Often the job lot quantities are so small that very little time can be afforded to allow for the changing of the tools. Removal of the die from the press to change tools is prohibitive because of the downtime that it would involve. Therefore, the construction must be

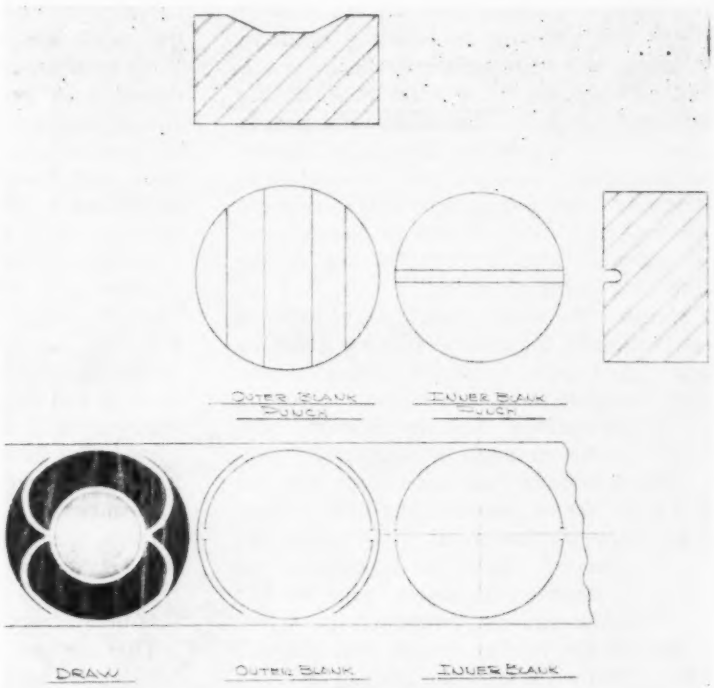


Fig. 2. The die in Figure 1 uses the two-leaf clover cut-out pattern. Shown above are the blanking punch designs that make the inner and outer cutouts in the first and second stations respectively.

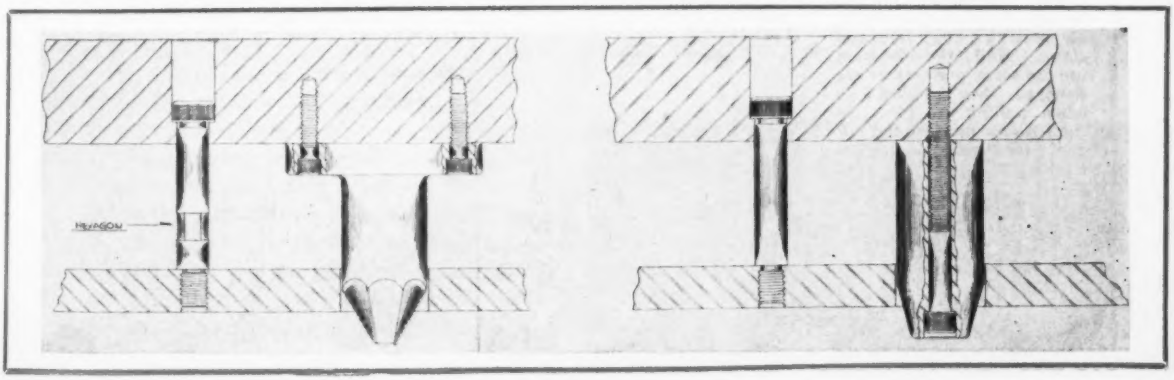
such that the die sections are screwed to the die shoe, and the punch sections are screwed to the punch holder.

Whenever possible the punches are secured with a single screw if a center installation is permissable, Figure 3. Sometimes, the shape of the punch prohibits a center screw fastening method and the fastening must be done through a flange in the base of the punch. When this prevails, the stripper bolts are ground with a hexagon perimeter so that a wrench can be used on them. This permits the removal of the stripper so that the punches can be quickly replaced.

One of the most important features of a die of this type is that the form and draw punch and die sections are not doweled. Doweling form and draw sections on a progressive die is a waste of time and effort. It is desirable that the form punch and die be permitted to float to find their true balance. You perhaps know that metal thicknesses vary somewhat from edge to edge. Well, the float between punch and die permits proper compensation and alignment.

Elimination of form punch and die doweling has proven to be a sensible and practical method of mounting those tools. Any time we can

Fig. 3. Where product design permits, the center screw method of securing change tools is preferred. If the tool can not accommodate a center screw, the flange mounting method, shown at the left, has to be employed. In such cases the stripper has to be removed when changing tools. A hex is groundon the stripper bolt so that is may be gripped by a wrench.



eliminate the time wasted by a skilled man in drilling a hole we feel that we are coming closer to the ultimate in building common sense dies rather than expensive dies.

Another feature is the method by which the secondary die sets are aligned in their proper positions. This is done by the use of tapered dowel pins. Tapered dowel pins permit you to locate easily the matching hole in the large die set because the entering end of the tapered dowel is much smaller than the top of the tapered hole in the die shoe.

In Figure 4 are shown two types of tapered dowels; either of the two performs with satisfaction. The type at the left is used whenever it is not desirable to have anything protruding above the die surface. The sketch shows how the dowel is driven down to secure it in position. This is done by running a screw into the tapped end. When placed in the hole a sharp hammer blow will secure it, after which the screw is removed. In order to remove the dowel it is necessary to slip a large washer over the screw and by threading the screw head against the washer the tapered pin will pull free. Once it is free, the pin can be lifted out by hand.

The other type of tapered dowel shown at the right in Figure 4, is made with a threaded shank over which a large washer is slipped and a nut started on the threaded shank. A sharp hammer blow will secure it. To remove the dowel the nut is turned down until it contacts the washer, and a pull with a wrench will free it. Then it can be lifted out by hand.

The tapered dowels are made from ordinary standard taper machine pins. If straight dowels were used instead of tapered pins their removal would be impractical if not impossible unless the die were removed from the press. With straight dowels, attempting to start the dowel could "peen over" the edge of the hole in the large die set and cause improper alignment. Perhaps this idea of doweling may be shopworn, but from the interest displayed at the exhibition it may be of value to newcomers in our field.

Another common sense feature of this die is the manner in which the lift pads are operated. There is a long lift plate extending beneath the die from the first cupping station to the final pinch trim station. All of the stations that require a pad to remove the part from the die sections have the pads secured to this long plate. The lift plate has a long travel during its cycle, therefore long springs must be used to insure long spring life. In this die the springs, studs and lift plate with pads constitute an integral part of the die. They are never removed either when the die is set up or when it is taken from the press.

This method reduces setup time by such a substantial amount that this feature alone is worth consideration. More important than saving setup time is the fact that the springs are in such a position that the operator can observe them at all times. In the event that a spring does break (and they do break occasionally), the operator stops the press immediately and replaces the spring from the open face of the die. Anyone who has undertaken the unpleasant task of replacing a broken spring from beneath a die can appreciate the true value of this clever departure.

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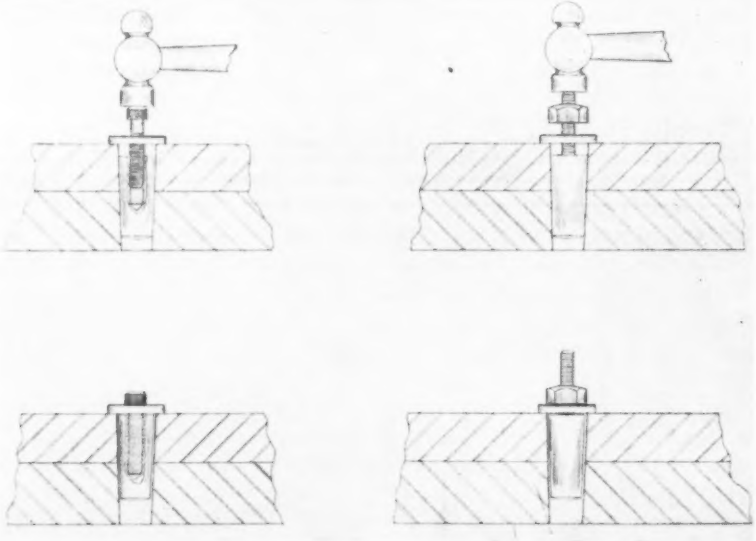
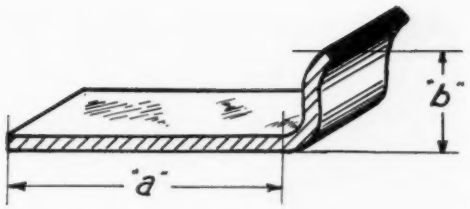


Fig. 4. Two types of tapered dowels. The one at the left is used when the top of the die must be kept free and clear. While the die is in use the screw and washer are removed. They are used only when pulling the pin. In the type at the right the nut and washer perform the extracting.



Component X

How to Achieve

POSITIVE STOCK RETENTION IN BENDING DIES

by W. M. Halliday
Southport, England

USING CONVENTIONAL BENDING DIES to reproduce an accurate bend located at one end of a workpiece, X, above, is not always as straightforward and easy as the simplicity of the part suggests. In practice, considerable difficulty may be experienced with such a bending operation, particularly where the following stringent working conditions and component requirements have to be satisfied:

1. If the workpiece is in a hard tough metal having smooth surfaces and considerable cross-sectional thickness.
2. If it has to be fed singly to the bending die in pre-cut lengths, as distinct from being bent and severed in the same die from long continuous coiled stock.
3. If only a single bend is required, near one end of the part; and where such bend has to be of substantial angle.
4. If the bend radius has to be less than about twice the thickness of the stock.
5. If the bent form has to be produced to precision limits, especially in regard to the lengths of the finished straight sides, "a" and "b".
6. Where the sides of the component are devoid of holes, recesses, indentations, or integral blanked or embossed projections, capable of being employed to locate and hold the part in the die by their engagement with the usual fixed locator pins or stops.

When a short length of stock, having the above features, is severely bent at one end only, there is a considerable tendency for the straight sides to be drawn from the initial setting unless the part is rigidly restrained. As the descending punch forces the stock past the stationary bending block B, great frictional drag is generated on the component around the bending area. This will result in the long straight side being drawn powerfully toward the point of bending. As a result that portion is fore-shortened.

This shift is clearly shown in Figure 1, which depicts a typical bending die in the closed position, with the bent workpiece X still in place. The long straight side has been pulled rightwards due to the bending, by the distance indicated by the space Y between the left-hand end of the component and the work stop face Z

Bending unsymmetrical workpieces creates pulling forces that tend to shift the piece in the die nest. Here are several die design features which will insure that the work "stays put" during the bending stroke.

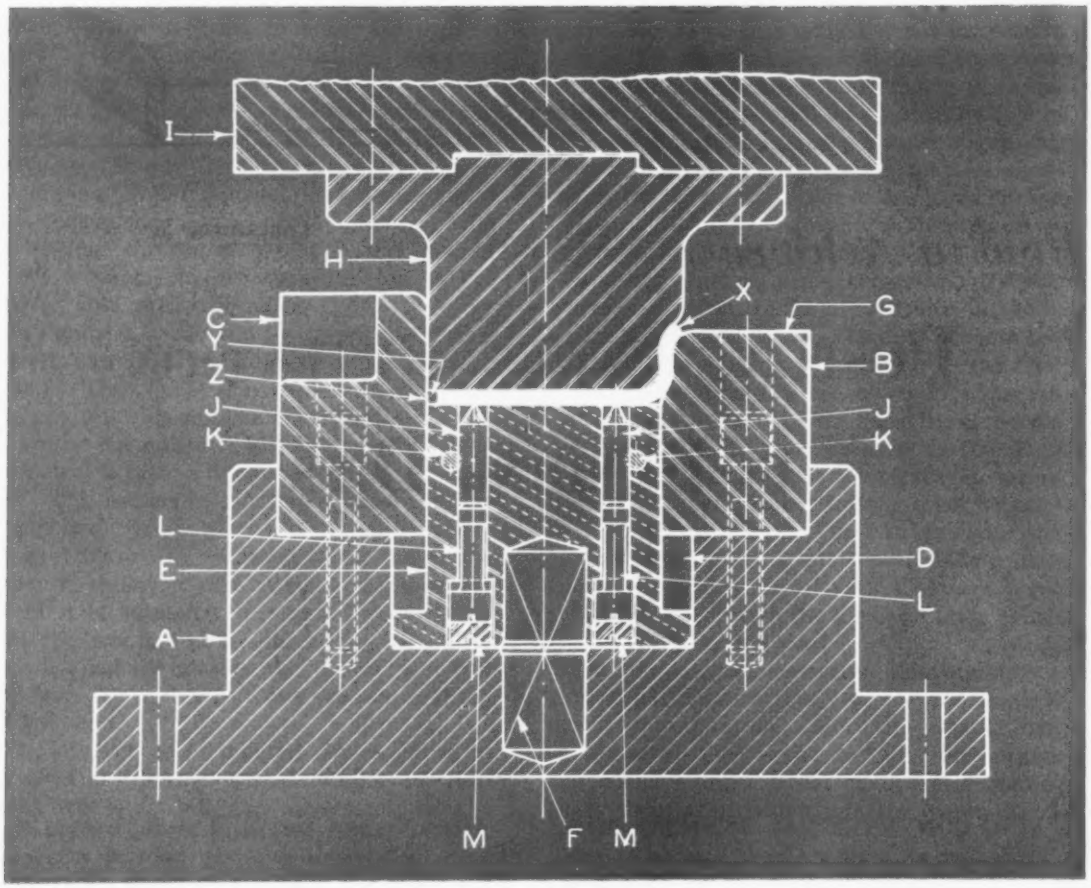


Fig. 1. Conventional die construction for bending workpiece X. Pointed retention pins J hold the blank from shifting laterally. Space Y represents the shift that would occur were it not for the retention pins.

on the die. Thus, the length "a" of the long straight side is made considerably undersize. The amount of shortening will differ with various materials and degrees of bend.

In the same way, the short leg of the component is pressed upwards and becomes longer than is required, so that dimension "b" varies accordingly.

If the part to be bent is very thin, or in some soft metal, or has to be but slightly bent at a large radius, these frictional drag problems and consequent inaccuracies do not arise in any marked manner. Likewise, if a thick, tough piece of stock has to be bent at opposite ends to approximately the same degree, the pulling forces origniating at each bend will act in opposition and will induce no shifting of the stock from its initial loading position.

For components having a single bend at one end, the tool designer has to introduce some means into the die for positively holding the blank in the correct position throughout the bending. The holding methods illustrated here are for use with a bending die of orthodox type, such as the one whose main features are depicted in Figure 1.

Positive Stock Retention By Pins

The work is loaded and retained in the correct place purely by the degree of frictional grip obtained by feeding the blank between the punch and the spring-loaded pressure-pad. Such frictional grip would doubtless suffice to hold a part made of exceedingly thin soft material and involving only a slight degree of bend. It would, however, be inadequate to retain a relatively thick part having a considerable amount of bend at one end.

The positive retention is built directly into pressure pad E, and comprises two hardened and ground cylindrical pins J. Each pin is smartly press-fitted into a plain hole provided in the pad. The holes, perpendicular to the top surface of the pad, extend the full length of the pad, and are situated centrally to the width of the stock X. The upper end of each pin is ground to a sharp point of about 60° included angle.

Each pointed pin is locked tightly in place by a locking pin K situated in a hole crosswise through the pad at an adjoining side of the vertical hole. A slight portion of the cross hole breaks through into the hole for the pin J. The hardened locking pin K has a short tapered flat along one side so that when it is driven tightly into place it wedges pointed pin J very securely within its hole in the pad. The lower end of each pointed pin backs onto the end of rod screw L whose enlarged lower end threads into a tapped portion of the hole in the pad. A small threaded plug M serves to lock the rod screw in any desired setting. By releasing the locking pin K the pointed pin J may be adjusted as to height.

Initially, the pointed pins J are set so that their points project a slight distance above the surface of the pressure pad on which the blank X rests. The amount of projection is determined largely by the thickness of stock, the extent of bend required, and the resultant drawing pressure falling on the blank during bending. Ordinarily, the projection may range from 0.004″ to 0.010″.

When the press is open with punch H raised out of the die blocks, the pressure pad is automatically raised so that a fresh straight blank may be located for bending. The punch then descends, and as it bears on top of the blank the latter is pressed against the pad and the pointed pins J penetrate slightly into the underside of the blank. Spring F is sufficiently powerful to insure that pins J penetrate into the underside of the work the necessary amount.

DIE PARTS LIST

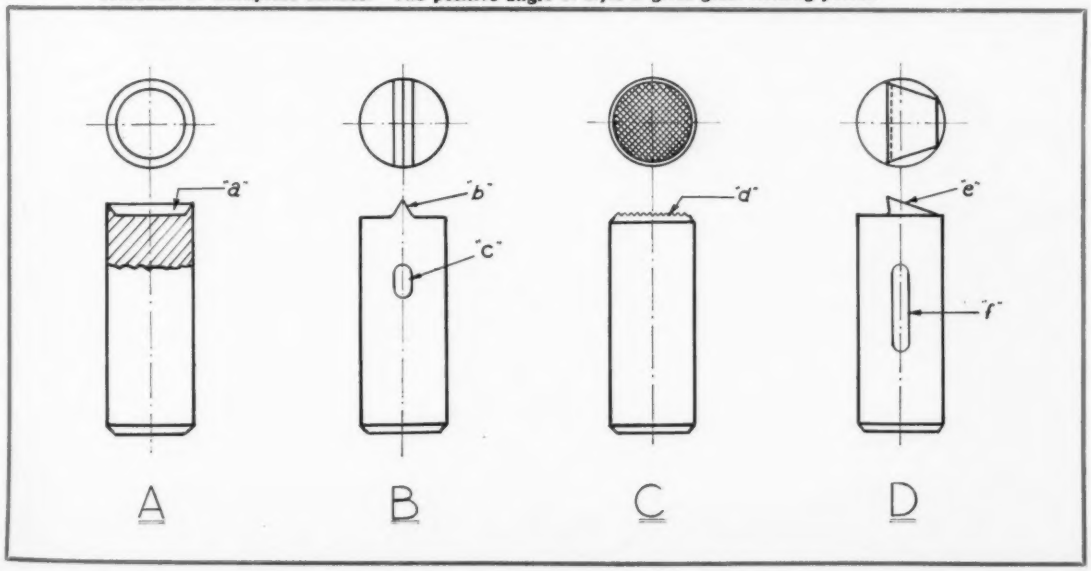
A	Lower Bolster	L	Rod Screw
B	Form Die Block	M	Locking Plug
C	Work Stop Die Block	N	Stock Guide
D	Pressure Pad Recess	O	Retainer Plate
E	Pressure Pad	P	Retainer Screw
F	Pressure Pad Load Spring	Q	Rod Screw
G	Work Feeding Surface	R	Locking Plug
H	Forming Punch	S	Serrations
I	Punch Plate	X	Workpiece
J	Retention Pin	Y	Shift of Workpiece
K	Locking Pin	Z	Work Stop Surface

The further descent of punch, workpiece, and pressure pad then completes the bend. The workpiece cannot move across the die away from the register face Z during the bending action because of the intervention of the pins J. Thus the component is formed to close accuracy as to both length "a" and dimension "b".

Should the points of pins J become worn or damaged, the pins can easily be removed for resharpening or replacement with new items held in stock for that purpose. It will be appreciated that more than two pins may be distributed in the pressure pad to obtain additional retention and/or less penetration of the blank being bent.

In cases where a particularly powerful longitudinal pulling force is imposed on the workpiece, it may be necessary to set pointed pins J to penetrate a considerable depth into the work. This may be prohibitive when the surfaces of the work are highly polished or where the presence of such prominent indentations would be precluded on other grounds; likewise when their removal would entail costly polishing or machining operations. To avoid this,

Fig. 2. Four styles of retention pins other than the pointed pin J of Figure 1. The serrated style at C can be adjusted for optimum conditions, i.e., a high degree of holding power with minimum indentation of workpiece surface. The positive angle of style D gives great holding power.



retainer pins may be employed having a somewhat different contact pattern for engaging the work.

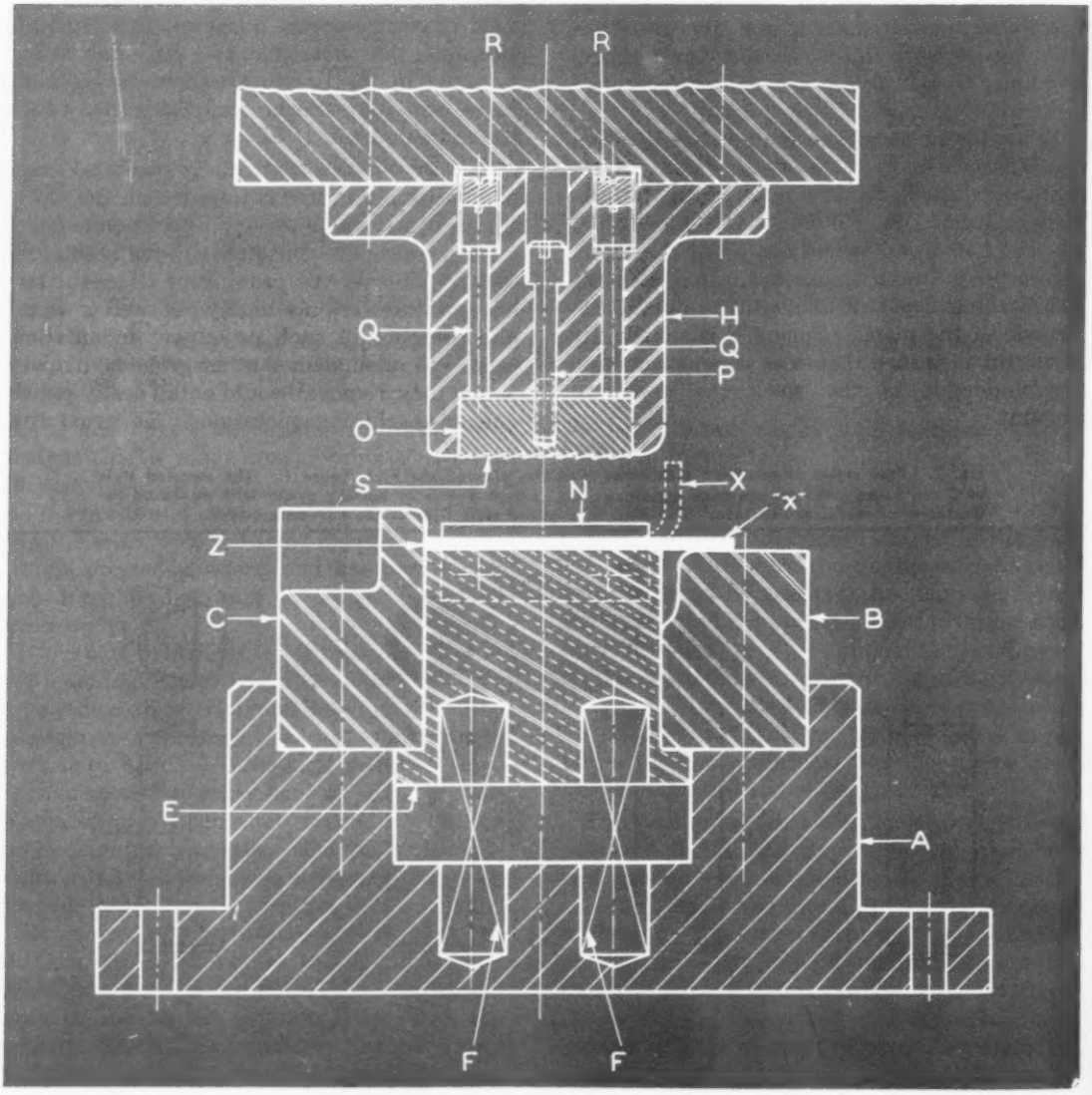
Figure 2 shows four useful alternative pin forms. All are suitable for applying considerable retention pressure in gripping the workpiece, while reproducing a minimum depth of impression on the component.

The first example, shown at A, comprises a hardened cylindrical steel pin The working end is dished out as at "a" and ground or machined to terminate in a sharp edge at the periphery. This end of the pin is set to project a few thousandths of an inch above the top of the pressure pad. When the part is tightly gripped between the descending punch and the pressure pad, the circumferential edge of the pin bites into the stock. With this style of pin a penetration of about 0.005" into the work imparts a very considerable degree of restraint.

The type of retainer pin shown at B, Figure 2, is especially effective where high pulling forces are applied to the workpiece being bent. The working end of this pin is formed with a vee-shaped tooth "b", which extends clear across the diameter. The inclined sides of the tooth are ground smooth and the crest is brought to a keen edge. The latter is set so as to bite slightly into the work and hold same against undesirable movement due to the pulling force originating at the bend.

To obtain the maximum gripping from such a pin, it has to be set so that the sharp tooth "b" lies transversely across the width of the

Fig. 3. In this design retention of the workpiece is assured by the serrated plate O built into the punch H. It is adjustably positioned by rod screws Q and checked by retainer screw P. Two stock guides N (only one shown) and die register surface Z form the locating nest for the workpiece.



stock X. Radial location of the pin is insured by means of the short elongated slot "c" milled in one side and in line with the diametral tooth. A peg-end screw is then provided in front of the pressure pad to engage in the slot. The purpose of using an elongated slot is to enable the pin to be adjustable in the pad according to the depth of penetration required by the tooth "b".

The kind of pin shown at C, Figure 2, is excellent for positive retention of stock that is subject to a lighter bending load and where pulling forces on the longest straight leg of the part are not so great. This is also a plain hardened and ground cylindrical pin. The contact end is provided with a pattern of serrations "d" similar to ordinary diamond type knurling. The serrations terminate in sharp crests, and are adjusted to penetrate very slightly into the work. This style of pin needs no special radial location in the pressure pad.

The type of retainer pin depicted at D, Figure 2, is intended for especially heavy gripping duty on large workpieces subject to considerable pulling during bending. In this case a buttress shaped tooth "e" is formed across the contact end. The front side of the tooth has a positive rake angle of 8° to 12°, while the relief angle of the tooth is from 25° to 30°. The gripping edge is made quite sharp. Such a pin must be located in a fixed radial position as with example B, for which purpose the elongated slot "f" is provided along one side of the pin shank. This is engaged, likewise, by a peg-end screw in the pressure pad.

All of these four kinds of retainer pins, when mounted in the pad, back up against an adjustable rod screw or like means, as with the initial example given in Figure 1, to obtain the required variations in height setting and the optimum depth of penetration into the work. Thus all may easily be adjusted for different degrees of retention in accordance with the pulling forces to be overcome.

Positive Retention of Stock By Serrated Plate

Figure 3 illustrates a similar conventional design of bending die for producing a single right-angle bend at one end of a thick piece of stock, "x". This is fed to the die in straight lengths as shown, and has to be bent to the final shape depicted by the light broken lines at X.

The positive retainer consists of a hardened steel plate O.

The working end of the punch has a deep milled slot extending almost the full length of the punch face and receiving the rectangular plate O. The latter is secured by the screw P from the top of the punch. The plate is drawn back by the screw against the hardened ends of the pair of long rod screws Q also contained in the punch. These are adjustable so that the plate may be advanced or retracted relative to the punch face. The rod screws Q are locked by the threaded plugs R screwed into the upper end of the enlarged and tapped holes in the punch.

The lower side of plate O is provided with a series of shallow serrations S, these being equally spaced apart, all the same depth, and having their crests brought to a relatively sharp edge, as with the tooth on the retainer pin shown at D in Figure 2. These teeth are disposed transversely across the width of the stock "x" with their cutting edges facing the fixed register face Z.

In this case the bending die is shown in the open position, with the blank "x" located on the raised pressure pad E and the top of the stationary die block B. It will be noted that the blank is pressed closely against the vertical register face Z on the opposite die block. Plate N is affixed to the rear of the pressure pad and a similar plate to the front of the pad (here omitted) to provide a parallel guideway for locating the workpiece in correct sideways relationship with the punch. For the sake of greater clearness serrations S on plate O are here shown exaggerated as to size. In actual practice these serrations are quite small and finely pitched.

This form of positive retainer is designed to exert a powerful grip on the large blank, which is subject to a heavier pulling force than the previous example due to the abrupt bend. Two stiff springs F are therefore employed to hold the pressure pad in the raised position while the serrated plate O first bites into the workpiece as punch H descends. The serrations penetrate only to a shallow depth and the gripping pressure is maintained throughout the remaining portion of the down-stroke until the workpiece has been correctly bent at the one end, as denoted by light broken lines at X.

end

Coming Soon:

"How You Can Save With Tubular Stampings"
"A New Appraisal of the Forces in Brake Forming"

PNEUMATIC CIRCUITS

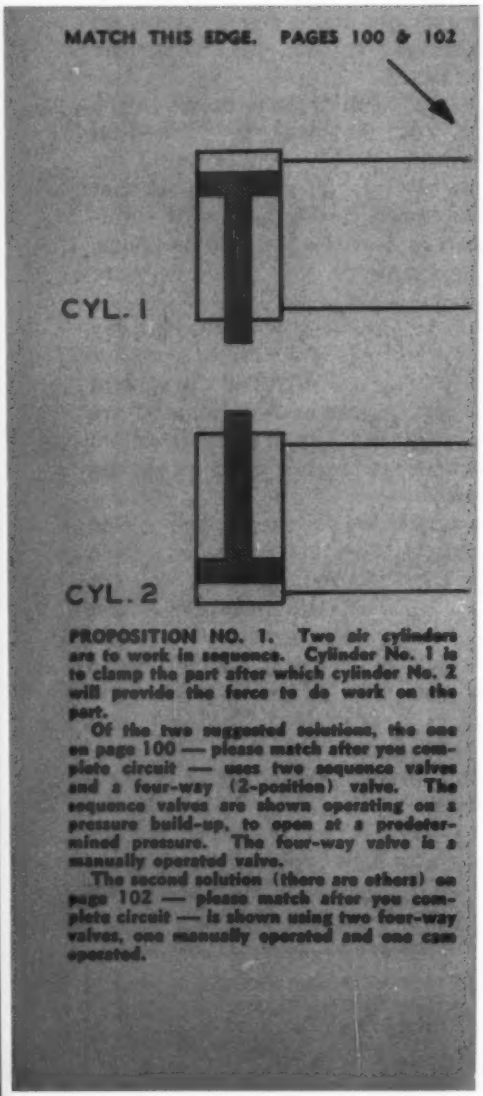
. . . an EASY, QUICK Way to their Understanding and their Use

by William E. Hoffman
Associate Editor

TO PROFIT MOST from this article it is suggested that you 1) read through the text and **completed** diagrams; 2) then complete the incomplete diagrams, in the space allowed; and then 3) match the pages as indicated to check our solutions against yours.

Along with the stating of several problems for your completion, suggestions have been made as to what valves were used in the solutions to be found on the matching pages.

To jog your memory before you start, the JIC symbols we used are presented below,

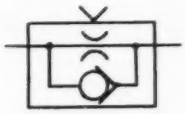


PROPOSITION NO. 1. Two air cylinders are to work in sequence. Cylinder No. 1 is to clamp the part after which cylinder No. 2 will provide the force to do work on the part.

Of the two suggested solutions, the one on page 100 — please match after you complete circuit — uses two sequence valves and a four-way (2-position) valve. The sequence valves are shown operating on a pressure build-up, to open at a predetermined pressure. The four-way valve is a manually operated valve.

The second solution (there are others) on page 102 — please match after you complete circuit — is shown using two four-way valves, one manually operated and one cam operated.

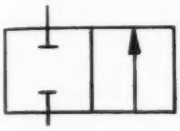
The JIC symbols you will find in the completed circuits and need to complete those circuits which are incomplete:



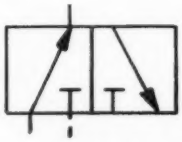
Flow Control Valve

Sequence Valve

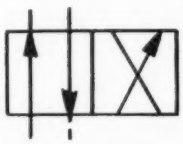
▲ READER SCRATCH HERE ▲



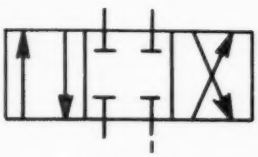
Shut-off Valve
Two-way
(2-port)



Three-Way Valve
(3-port)

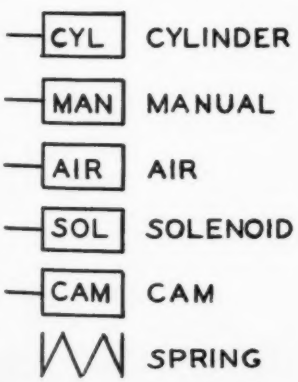


Four-Way Valve
(4-port)
(2-position)



Four-Way Valve
(4-port)
(3-position)

To indicate the manner in which the valve is actuated: Attach the proper rectangle, by its tail, to the valve symbol.



along with a brief description of the basic valves involved.

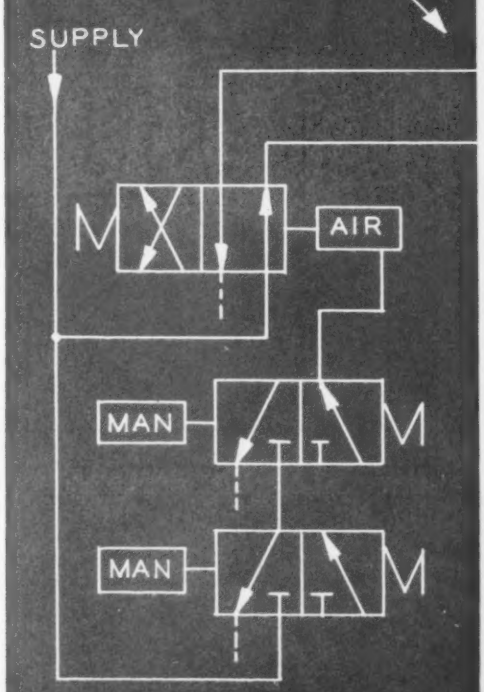
- A two-way valve is a shut-off valve.
- A three-way valve has three ports*1; an inlet port, a port to the device to be activated (this port also receives the exhaust from the same device, when the valve position is changed), and a port for exhausting (usually to the atmosphere).
- The four-way valve (the most versatile) can be purchased in either 2-position or 3-position. The 2-position can be piped to feed compressed air to one device while exhausting another, or in the 3-position version it can be purchased with all ports blocked in its middle position*2.
- Sequence valves pass air to the next device in the sequence by opening at a predetermined pressure. This is accomplished by a pressure build-up against a spring whose tension is adjustable.
- Flow control valves are speed control valves which operate on a metering principle, being open in one direction and having a variable restriction in the other direction.

The air cylinder (air motor) offers an infinite variety of motion between fast and slow speed, high and low pressure, and starts and stops. They are capable of movement in only two directions — forward and back (push and pull)*3 and about these in-line motions their usefulness is applied. The lifting, lowering, tilting (through linkage), pressing, holding, clamping, bending, rotating*4, feeding*5, and other tasks would not be possible were it not for valves.

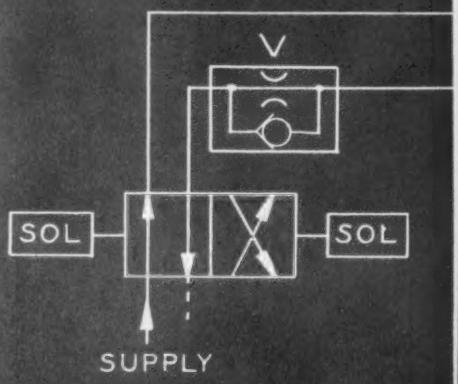
Progress was somewhat impeded until JIC (Joint Industry Conference) gave the engineer a common language in this important phase of his work.

We feel that attention

MATCH THIS EDGE. PAGE 101



SOLUTION TO PROPOSITION NO. 2



SOLUTION TO PROPOSITION NO. 3

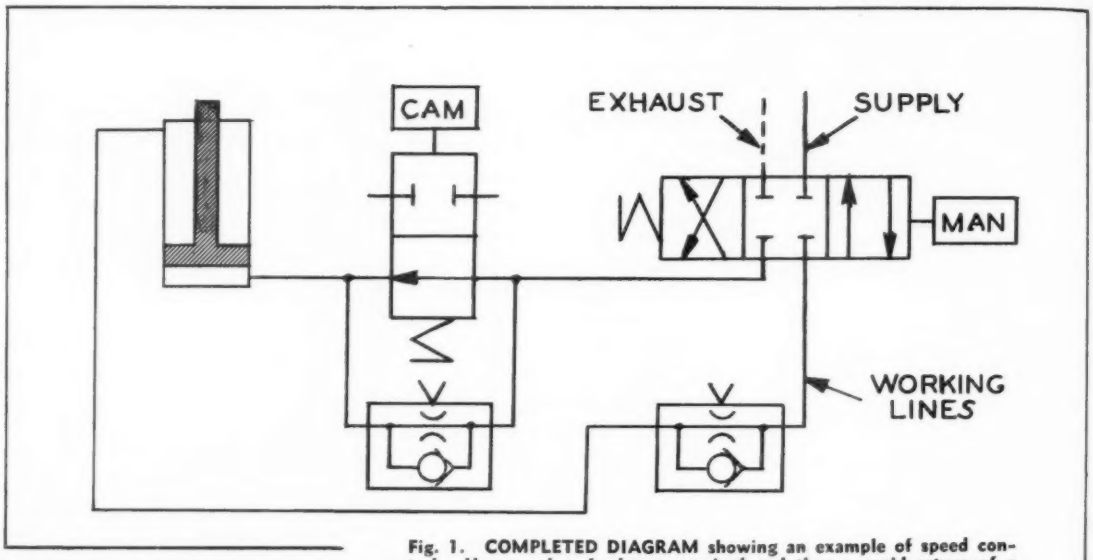
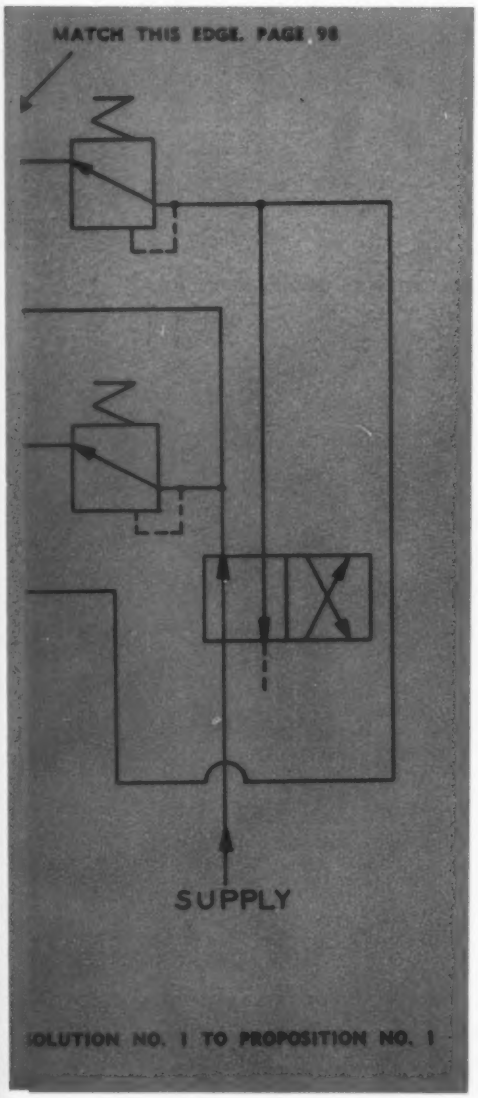


Fig. 1. COMPLETED DIAGRAM showing an example of speed control. Here, a slow feed was required and then a rapid return of a long stroke air motor. Cam is contacted near the end of the rapid return stroke, which brings into play the speed control valve in the exhaust line to slow the piston in this portion of the cycle.

Manually, the operator shifts the four-way valve (3-position spring-centered) to allow air to flow to the blind end of piston. Whereby, piston moves up at a speed controlled by the setting of the speed control valve on the now exhausting rod-end of cylinder. Work having been completed the operator shifts manual four-way valve, and the piston returns rapidly until cam is contacted and second speed control valve takes over to slow piston for the remainder of stroke.



should be called to the fact that the JIC symbols as they appear in pneumatic circuit drawings, are not necessarily as they will be shown (and correctly so) in the various manufacturers' bulletins supplied as a service, or in circuit diagrams furnished by machine builders. Often they are turned end-for-end or are 90° out of position to suit the best arrangement in the diagram. Many times they are out of proportion, as a result of hasty drafting. However, if they are made up of the proper elements in the right number it is probably the valve or device you suspect it to be. If in doubt and you are ordering parts from a diagram — better study the circuit carefully to make certain you are ordering what is required.

For instance, in regard to the proper elements being used to make up the symbols, the three-way valve is always made up of two boxes. It will help to remember that the two boxes represent the 2-positions*[6] (usually) of the valve for channelling air. Three-way can be remembered as 3-ports.

The four-way valve will be shown with either two boxes (2-position) or three boxes (3-position)*[7].

Arrows and elements within the boxes should connect or disconnect the ports to coincide with the positions of the air motors or devices being activated. This is important if your diagram is to be easily understood.

Figure 1 is a good example of the principle of speed control. Here, both the work stroke and the return stroke are controlled; the nature of the operation required a slow work stroke and the production rate necessitated a fast return to the next work cycle. Unrestricted air flow to the rod end of the piston would have effected the speediest re-

turn to starting position, but since the piston was so long and heavy the impetus with which it returned could not be tolerated. A speed control valve had to be employed on this half of the cycle, but only for the last few inches. By employing a cam roller to close the two-way valve and channel the air around through the speed control valve, a happy situation was set up.

In Figure 2 a semiautomatic cycle employs a manual start valve system with a cam actuated return. It is unique in that it uses the principle of bleeding to shift the master valve. The bleeding is done through the manual two-way valve to start piston into its work cycle and the cam operated two-way valve for reverse.

Of the many valve construction-types, the spool type lends itself to bleeding nicely. The idea is to shift the spool in the valve so that the annular grooves connect the desired ports. As the shifting of the spool is linear (back and forth) and the action of the air cylinder is forward and back, they combine well into an in-

Footnotes:

[1]Industry furnishes a tremendous variety of special valves which are built around the several basic schemes. For instance the three-way valve can be had with all the ports blocked in the middle position, with more than three ports, etc.

[2]In certain instances the four-way valve is very helpful when exhausting is arranged in the middle position.

[3]It should be noted that when a double-end air cylinder is used, pushing and pulling can be accomplished at the same time.

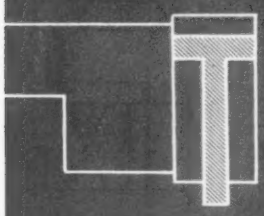
[4]In reference to a rack on the piston rod, rotating a gear as it advances or retracts.

[5]The fact that air is compressible should be given careful consideration when contemplating an air feed.

[6]Three-way valves can be purchased in 3-position construction where the circuit calls for all ports to be blocked when the valve is in its central position.

[7]The four-way valve when purchased in 3-position construction has all of its ports blocked when set in its central position.

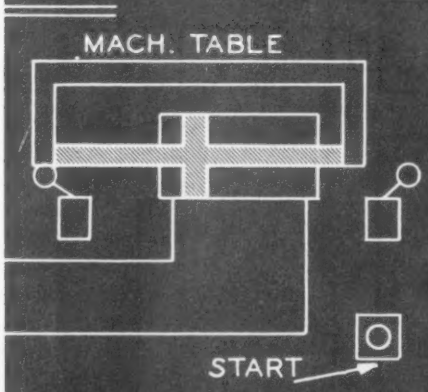
MATCH THIS EDGE PAGE 99



PROPOSITION NO. 2. Safety for the operator's hands is required in an air press operation. Two valves should be required (one to occupy each hand) to provide pilot air for a four-way pilot controlled valve.

The solution shown (one of many) page 99 — please match after you complete circuit — uses two manual three-way valves for pilot pressure to an air activated four-way valve, through which the air is channelled to the piston.

If for some reason two operators are necessary, then four three-way valves (for 4 hands) would do the trick.



PROPOSITION NO. 3. The basic valves are to be supplied in a pneumatic circuit for a machine table feed. A slow controllable feed plus a fast return are needed.

The solution (there are others) on page 99 — please match after you complete circuit — uses a four-way double solenoid activated valve. The solenoids are energized by limit switches and the cycle is set into motion by a manual start button.

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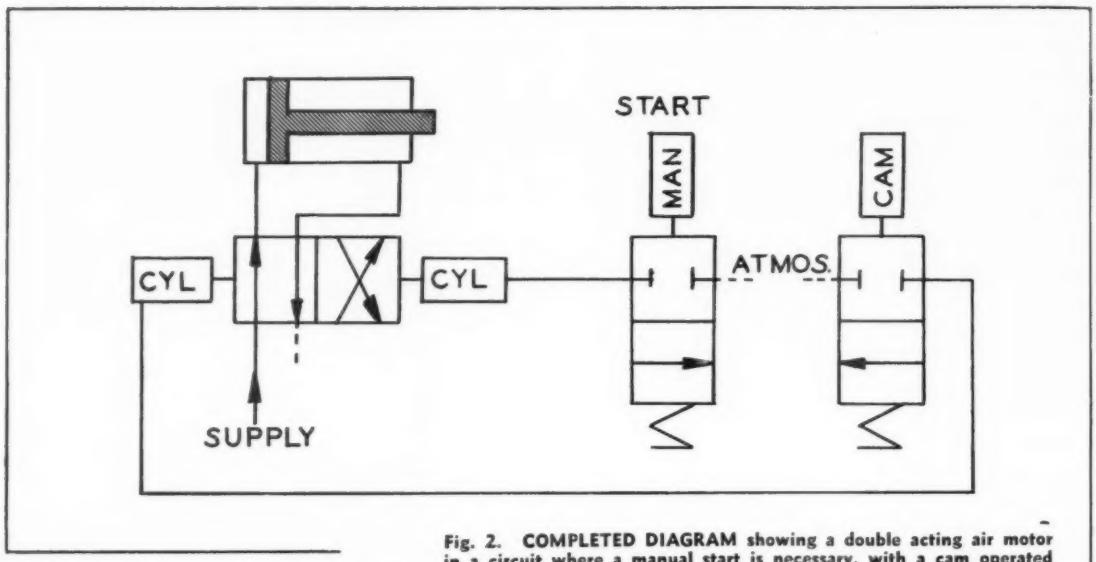
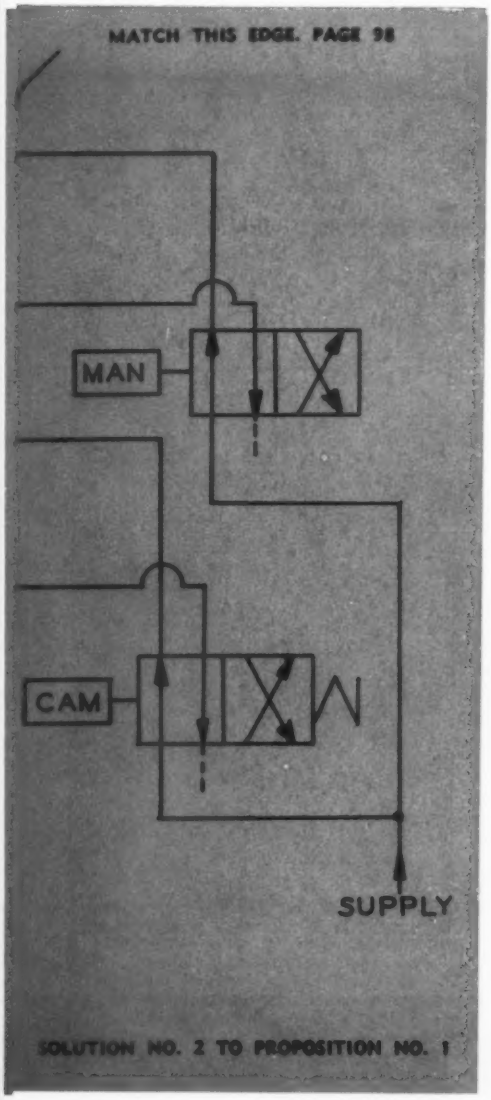


Fig. 2. COMPLETED DIAGRAM showing a double acting air motor in a circuit where a manual start is necessary, with a cam operated return. Actuation of four-way valve is by a designed-in bleeder arrangement.

Operator depresses bleeder valve, which bleeds right-hand cylinder of four-way valve allowing valve to shift to position shown. Piston of air motor does its work to the right, contacts cam actuated bleeder valve to bleed left-hand cylinder of four-way valve, shifting air passage so that piston returns to left, to complete cycle.

MATCH THIS EDGE. PAGE 98



SOLUTION NO. 2 TO PROPOSITION NO. 1

tegral unit to make up a bleeder type valve.

One small air cylinder is built-in to each end of the valve, in such a way that when the compressed air is fed to the valve the cylinders are in balance and the spool in turn in a predetermined neutral position. However, when a two-way valve is arranged to exhaust to the atmosphere from either of these cylinders the spool is shifted by the other cylinder, and the air is directed to the device to be operated. The description in the caption explains the circuit and its operation as it is diagrammed.

At this point you are invited to proceed to proposition No. 1 on page 98, take a pencil and complete the diagram.

WE BELIEVE that the type of presentation used in the article above is unique and different—also that you have enjoyed the opportunity to participate in it.

Those of you who work with pneumatics regularly, will have had an opportunity to work out some of the solutions that are possible, other than those suggested.

The occasional user of pneumatic systems will have profited from the review. Some of his past impressions may have been confirmed and a few ideas new to him may have been presented .

For the beginner this article may have been invaluable as study and future reference material. See also other "Air Power for Metalworking" stories which have appeared in past TOOLING & PRODUCTION issues and others yet to come.

All editorial subjects do not lend themselves to reader participation as this article did. However, if you like it, we can keep a "lookout" for future possibilities. LET US HEAR FROM YOU. YOUR COMMENTS WILL BE APPRECIATED. end

BARRELS TUMBLE $30,000 FROM STAMPINGS FINISHING COSTS

by Kenneth D. Higgins
Industrial Engineer
Adding & Accounting Machine Division
UNDERWOOD CORPORATION
Bridgeport, Conn.

A PROGRESSIVE BARREL FINISHING SYSTEM, employing modern equipment and up-to-date techniques, has slashed deburring and polishing costs by more than $30,000 a year at the Bridgeport, Conn., works of the Underwood Corporation.

The firm manufactures a wide range of business machines, including adding machines which contain up to 1,000 different parts, most of which must have bearing and wear surfaces with rms readings of between 8 and 32.

Within the last year, barrel finishing has reduced finishing costs from 70¢-$1.10/100 pcs to an overall average of 10¢/100 pcs — a savings of nearly 90%.

An example of cost savings on a specific part is the "carrier pawl", 20 of which are used in each adding machine. This part is literally the heart of the machine . . . and Underwood uses about a million of them a year.

Prior to the present barrel finishing system, which was developed in cooperation with Precision Tumbling and Supplies Co., Stratford, Conn., a distributor of "Honite" brand barrel finishing products, there were 15 separate operations being performed to finish each carrier pawl from blanking through plating.

Now there are six — only one of which is actually a finishing step. On this part alone total savings amount to $11,750 annually.

The accompanying table shows the way the operations sheets compare for processing the carrier pawl (note that there were scattered tumbling operations in the old method).

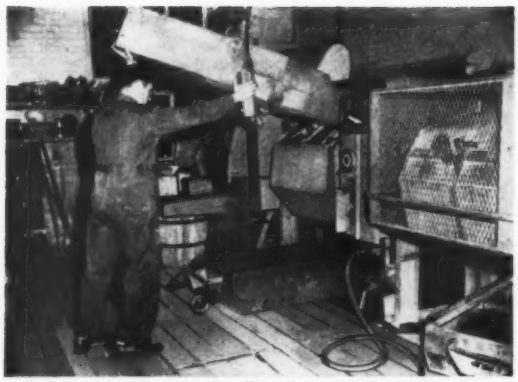
OLD METHOD (Hand Work Plus Tumbling)	PRESENT METHOD ("Honite" Barrel Finishing System)
1. Blank	1. Blank (automatic presses)
2. Pierce and shear	2. Pierce and shear
3. Tumble to break shavings	3. Clean
4. Separate shavings and parts	4. Case harden
5. Shave critical dimension	5. Barrel finish
6. Disc burr (Note: must be extremely smooth)	6. Plate
7. Burr one hole—both sides	
8. Barrel polish	
9. Case harden	
10. Tumble	
11. Stack for hand polishing	
12. Buff edges	
13. Plate	
14. Buff for brightness	
15. Straighten	

Operations numbers 3, 4, 5, 6, 7, 8, 11, 12, 14 and 15 have been completely eliminated by modern barrel finishing techniques and improved stamping procedures.

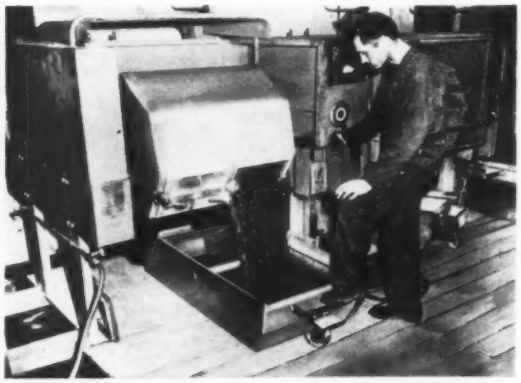
When Underwood decided to modernize its barrel finishing department, 12 belt-driven barrels were individually motorized and augmented by six model VS-3 "Honite" brand horizontal-type barrels with variable speeds. In addition, two single speed horizontal barrels were reconditioned and put into use, and a double chip bin, six hoist pans, a magnetic chip separator, and a chip sizing machine were acquired.

The investment paid for itself in less than a year.

The "cam slide" is another example of why the Underwood Corp. was able to pay off the investment so rapidly. This is a part that has slots in the sides, and controls the actions of several other parts. The previous method of finishing was hand honing (slot by slot) in a bench operation. In all, four hand operations were performed in finishing.



Power hoisted pans simplify the operation of loading the workpieces into the barrels. Safety in handling is enhanced as well. Six of these pans in the Underwood finishing department are necessary to handle the work volume.



Unloading the barrels is virtually a fingertip operation. With the unloading, water is drained off and the parts are moved along to the magnetic chip separator. Each barrel has a pocket for data cards giving the finishing procedures for each type of part.

The sides of the cam slide must be exceedingly smooth because they are in direct contact with other surfaces. The back of the slide and the edges of each slot are wear surfaces. The parts are ultimately chrome plated.

The parts, run 3,000 to a machine (1,500 per compartment), are barrel finished for 12 hours,

After water has drained from the chip pan, parts and chips are magnetically separated in an easy operation. This insures complete separation as well as protection for finished parts.

using compound, No. 3½ Super Honite chips, a rust inhibitor and water.

Hand polishing the cam slide required 3,900 man-hours annually; barrel finishing requires 500 man-hours annually, and the rate of finishing has been substantially increased.

The carrier pawl and the cam slide are typical of parts produced by the Underwood Corporation. For the most part they are made from SAE-1010 cold rolled steel, and a good portion of the work is tumbled hard. Sizes vary from parts ⅛″ x ⅜″ x .042″, to blanks 4″ to 6″ long. Finish requirements range from 8 to 32 rms, depending on whether the part is to be painted or plated, and whether the surface will be in contact with other surfaces. Tolerances must be held to .002″-.003″ or less in most cases.

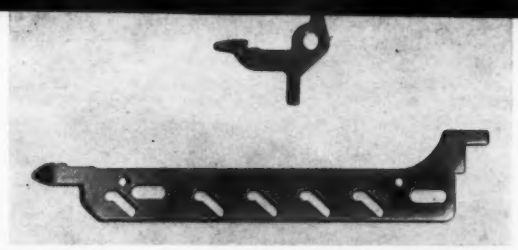
Barrel finishing volume runs anywhere between 50,000 and 100,000 parts a day, depending on the type of operation and the size of the barrels being used. All of the barrels (20, including open end types) are lined with neoprene.

At present, the average run time is eight hours; however, with further experimentation we believe time cycles can be reduced. A special barrel was installed for experimental purposes, but for the most part the barrel finishing schedule is so tight that the "laboratory" barrel has been doing production work. The entire barrel finishing facility — pickling and cleaning of all heat treated work as well as cyanide removal — is operated by four men.

As increased savings result from barrel finishing, more and more parts which had been finished by hand are being routed through the barrel finishing department. Each time a part not previously barrel finished comes into the department, the following steps are taken: (1) barrel finishing records are checked to determine if there is a similar part being finished; (2) if so, that record is pulled and the new part is given a test run in a barrel loaded as the card indicates; (3) results of the test run are carefully checked, and the barrel load modified as necessary (that is, perhaps slightly more water or less compound, greater chip-to-load ratio, or increased speed) to produce the desired finish.

Starting with a record of a similar part, a great deal of time is saved in setting up a finishing cycle for a new part. If there is no such record on hand, however, it's necessary to start from the beginning, following these steps:

1. Load the barrel between 50% and 75% full of chips (selected as to shape, size and hardness depending on operation to be per-



The carrier pawl (top) and the cam slide were the first two parts on which substantial savings were made through barrel finishing. About a million carrier pawls are finished each year.

formed) and sample workpieces. Add water and appropriate compound in the amounts recommended for the operation to be performed. (To determine water level and compound for test runs, Underwood Corporation works on recommendations made by the "Honite" distributor and barrel finishing field engineer.

2. A barrel speed is selected and the machine set in motion. About 12 rpm has proved to be a good starting speed, with the workpieces being checked at intervals to be certain that undesirable results are not being obtained.

3. If none appear, the run is continued and checked periodically until the desired finish has been produced.

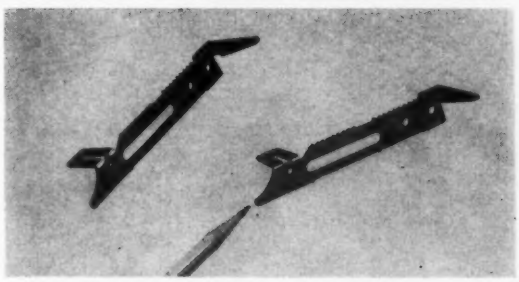
Complete records of production runs are filed for each part, so that over a period of time "fresh starts" on similar parts become less and less necessary — thus getting new parts into production finishing almost as soon as they are submitted for processing.

The Underwood plant safety program has moved hand in hand with the expansion in the barrel finishing department. Safety gates are a "must" on all horizontal barrels, low voltage controls are standard equipment, and a wood-over-concrete floor which allows for drainage of spilled water is regularly treated with a non-slip compound. All moving parts are painted bright yellow; electrical boxes are orange, and stationary equipment and parts are light green.

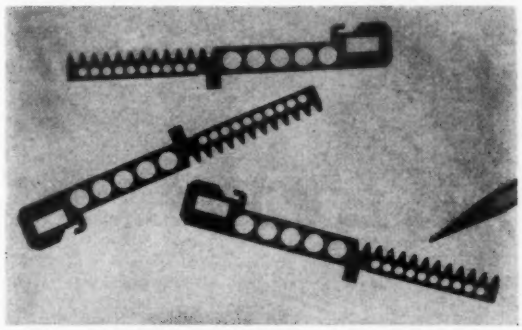
The increased use of barrel finishing is reflected, of course, in the decreasing number of hand operations being performed. When Underwood first started the present modernization program about 21 polishing jacks were in operation; now there are 12. There were eight men burnishing and draw filing; now there are five with production almost doubled (the three men who were displaced from these jobs were relocated within the Bridgeport plant in jobs equal to or better than the ones they formerly held).

Underwood personnel are continuing to improve and refine our barrel finishing techniques. The remarkable thing, we say, is that with a moderate amount of modern equipment and the instigation of careful record keeping and experimentation, finishing costs already have been reduced by about 90%.

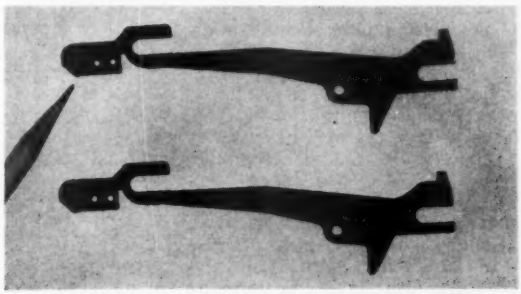
end



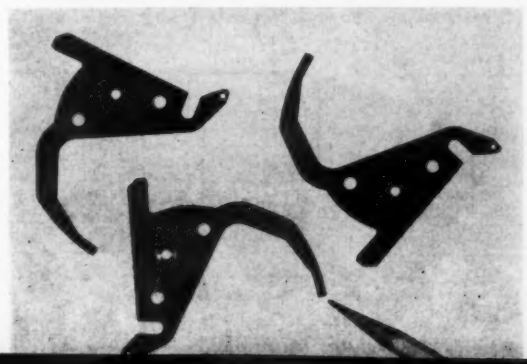
On parts like this back spacer and restore bracket, barrel finishing holds close tolerances such as the radius indicated by the pencil. Rough tooth edges have been smoothed, yet the evenness of the teeth has been maintained.



Barrel finishing of the type bar rack has eliminated six hand operations including deburring, brushing and buffing. With 12-hr processing at a barrel speed of 8 rpm, 800 pcs per compartment are finished in a two-compartment barrel.

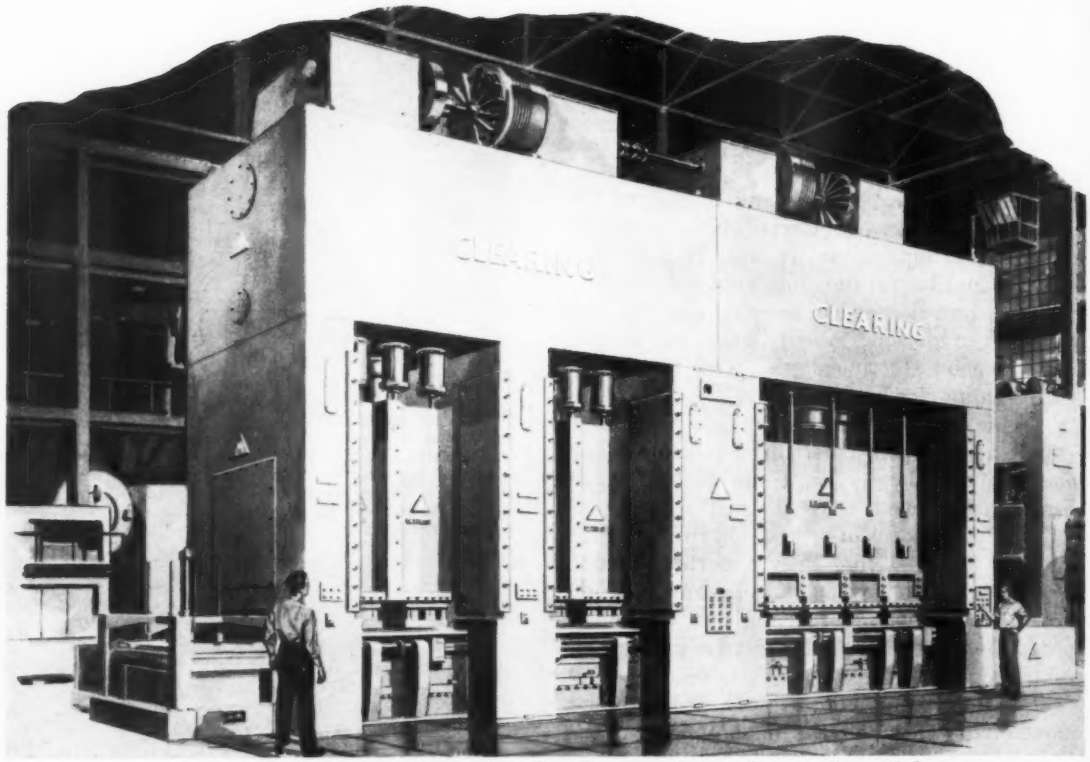


Two filing operations, a polishing and a buffing were the hand processes eliminated when the Underwood Corp. started barrel finishing this ribbon holding lever. Note in the finished piece (below) how the small nib (indicated by pencil) has been retained.



This hammer, shown both before (upper 2 pcs) and after barrel finishing, was processed for 12 hrs at a barrel speed of 12 rpm, with 1000 pcs per compartment.

Photos, courtesy Minnesota Mining and Manufacturing Co.



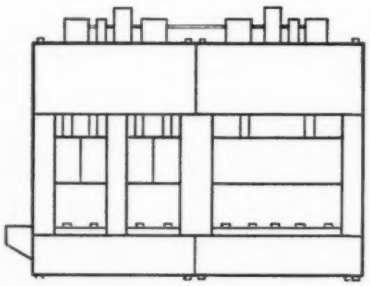
An example of modular construction is the giant Transflex press that produces washer and dryer tops.

Modular Press Design Defeats Obsolescence

A NEW CONCEPT in press design has been introduced which provides manufacturers with a means to alter the physical characteristics of the presses to provide for future changes in manufacturing requirements.

As production requirements must be modified to provide for major model changes, the modular Transflex equipment built by Clearing Machine Corporation, division of U. S. Industries, Inc., can also be modified to accommodate them. This construction provides long range obsolescence insurance.

An example of modular construction is the giant Transflex press, a drawing of which is shown, that produces washer and dryer tops for General Electric. This tremendous installation is 58′ long with twin drives and two crowns and two beds sharing common uprights. It has a transfer feed stroke of 50″ and will produce over 700 stampings/hr.

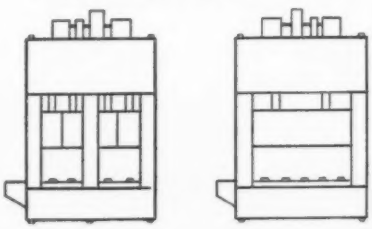


The press as it is now, producing GE washer and dryer tops in a dual tooling setup.

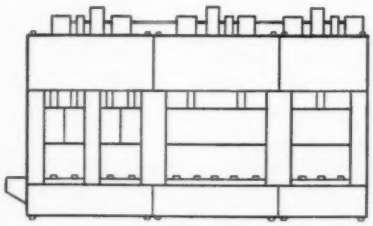
Designed for integrated production, the press produces washer tops for four hours and then converts to four hours of dryer top production with only a 10 min change-over period required. This quick change-over time is possible because of the split slide construction on the first two stations; non-used punches can be adjusted up and out of the way. In addition, several retractable sub-slides are mounted on the bottom of the large slide. These, too, can be adjusted rapidly during changeover. Micrometer shut height indication is provided on all slides and sub-slides.

The series of sketches show how this press might be modified in the future to meet changing production requirements. Here is capital investment equipment that can never outlive its usefulness and become an industrial "white elephant".

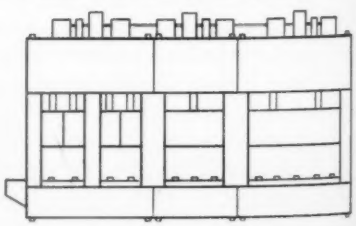
As model changes modify production requirements the modular unit may be separated into two presses, or . . .



additional modular may be added to either end of the machine to increase the number of available stations, or . . .



additional modular units may be placed in the center to alter the sequence of tonnage capacities, etc.



Progress in the

DEVELOPMENT OF DIE CUSHIONS

by D. A. Rogers
DAYTON ROGERS MANUFACTURING CO.
Minneapolis 7, Minnesota

PNEUMATIC DIE CUSHIONS have become more or less a standard part of power presses through the many years since their first practical application. They have been accepted as the most practical means of providing resistance for draw work and many other applications, such as stripping, trimming, and forming.

Die cushions have gone through a period of evolution similar to that of most other mechanical devices, in that many years of trial of various designs was necessary to develop the few standard types furnished to Industry today. The following illustrations show some of these designs and the advantages and disadvantages which led to present-day practice.

Figure 1 is probably the simplest possible design consisting of a movable piston within a stationary cylinder with appropriate packing. The main disadvantages to this design are the lack of piston guidance to prevent binding and the difficulty of preventing dirt and other foreign matter from working into the cylinder and packing.

Figure 2 overcomes the lack of guidance by the addition of a center piston rod or stem, which is permanently attached to the piston; however, the problem of preventing foreign matter from working into the critical working surfaces is still present. The result is that the service life of the packings and other components is drastically reduced. For this reason the general trend in cushion design switched to a construction similar to that shown in Figure 3.

In this design the outer member becomes the one which moves; therefore, it is impossible for falling dirt to work its way into the packing and bearing surfaces. Most cushion installations require a larger volume capacity than that available within the cushion itself. The larger volume limits the pressure buildup within the cushion and subsequently produces

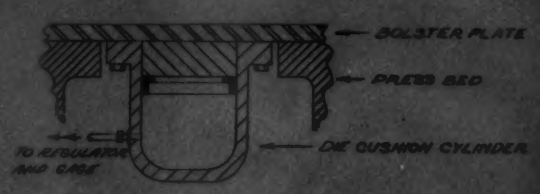


Figure 1

Figure 2

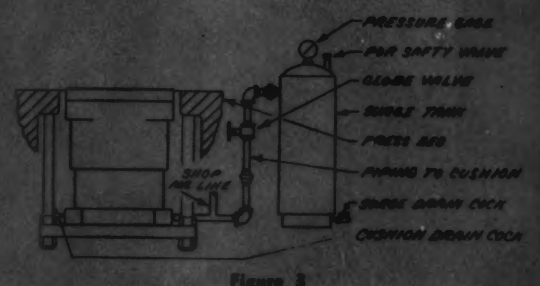


Figure 3

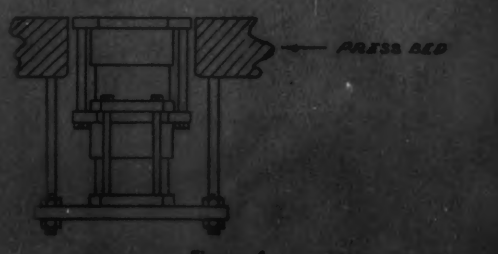


Figure 4

Also see "High Pressure Pneumatic Die Cushions", TOOLING & PRODUCTION, April 1955, p. 67.

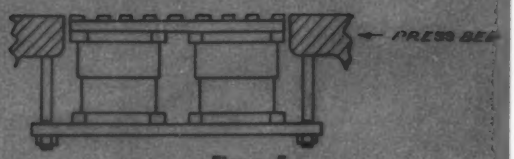


Figure 5

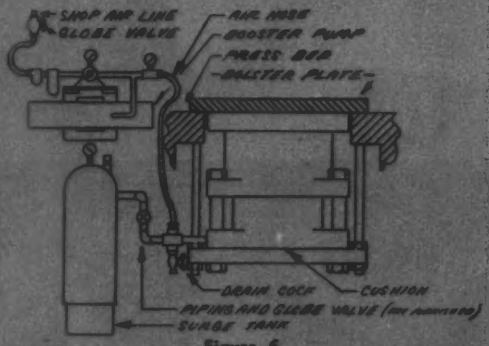


Figure 6

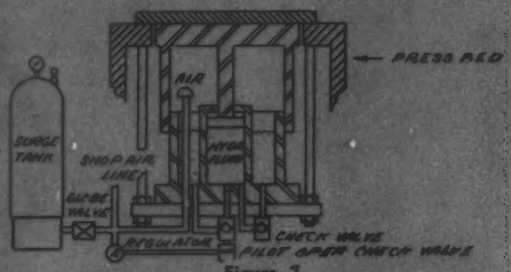


Figure 7

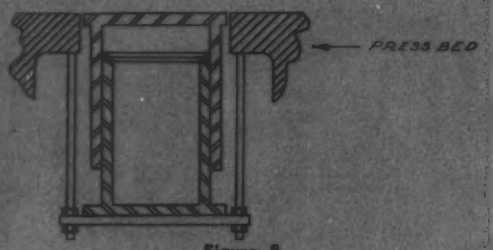


Figure 8

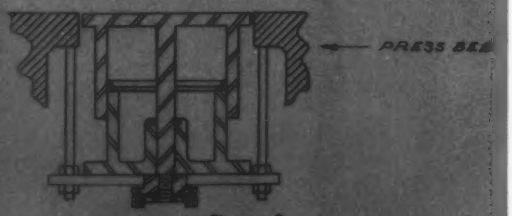


Figure 9

a more constant force as the cushion is compressed. Experience has shown that **a total system capacity of six times the displaced volume will offer the best performance.**

Another advantage of this design is its versatility in application. Figure 4 pictures a method for installing one cushion on top of another to gain twice the effective ring holding force. In this application the movable components, or cylinders, are tied together with appropriate spacing rods. The stationary member, or pistons, are fastened together in the same manner. This design is used when a cushion of sufficient capacity cannot be installed because of physical limitations of the press bed. Generally speaking, a press should be equipped with sufficient cushion capacity to produce from one-sixth to — in some cases — one-fourth the rated press capacity.

The cushions can also be installed side by side, as in Figure 5. This application is quite common, and is used in presses that have rectangular bed openings. An installation of this type will distribute the load over a wider area of the bed, and therefore cause less wear to the moving components.

Having established a reliable design for cushion construction, the next problem faced was a result of the increasing knowledge and technical know-how of those in the metalworking industry as well as those in the basic metal producing industry. With the advent of better metals and the increasing knowledge of their behavior, more intricate designs and shapes became possible; however, in order to draw these shapes, greater resisting force was necessary to prevent wrinkling of the part being drawn. It was therefore necessary to offer greater cushion tonnages within the same existing space in the press bed.

One of the better designs to cope with the above mentioned problem is that shown in Figure 6. This design retained the time-proven principle of increasing the air pressure within the cushion to as much as twice the former maximum, and as a result doubling the available force within the same physical space.

To do this the cushions had to be completely redesigned to withstand the increased pressures. Increased strength was obtained by going to an all-wrought welded and normalized construction. To counteract the wearing forces, a bronze overlay was welded directly to the piston bearing surface. Convenient and uniform distribution of lubricant was obtained by a centralized lubrication system. Cushion walls were more than doubled in thickness to withstand the terrific beating they had to absorb. The net result was a cushion unexcelled

. . . Continued on Page 123

A Head for Low-Cost Production

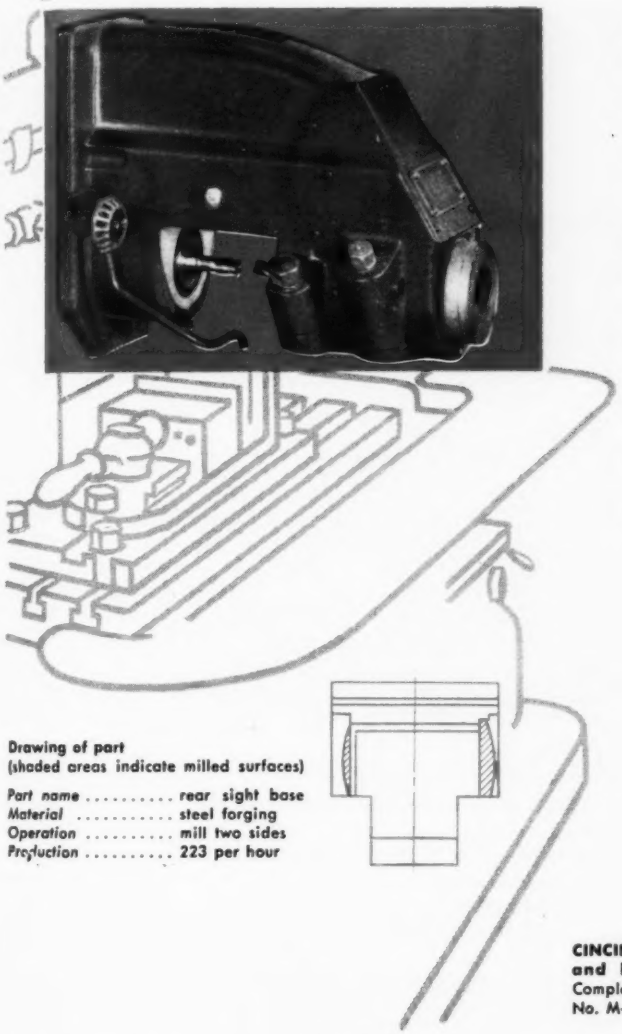
Duplex Head on Cincinnati 0-8 Plain Rise and Fall Mills an Extra Surface

This machine has a head for business. It's a CINCINNATI® No. 0-8 Plain Rise and Fall Milling Machine, equipped with a duplex head to mill **both sides** of small parts in **one cycle**, and **one handling** of the work.

Production averages 223 parts per hour, about double what it would be without the Duplex Head. The drawing below indicates surfaces milled.

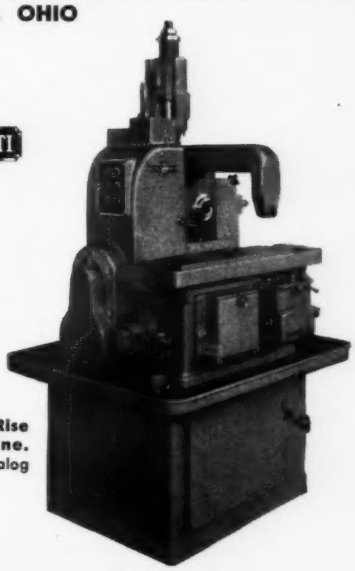
This equipment is the work of Cincinnati Application Engineers, a group of specialists who help metalworking industry reduce the cost of doing business. You can enlist their aid by sending blueprints and complete data on the parts which you suspect of being high-cost components. Meanwhile, you might like to know more about the highly productive 0-8 Milling Machines. Look in Sweet's Machine Tool File, or write for catalog No. M-1607-2.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



Drawing of part
(shaded areas indicate milled surfaces)

Part name ..... rear sight base
Material ..... steel forging
Operation ..... mill two sides
Production ..... 223 per hour



CINCINNATI No. 0-8 Plain Rise and Fall Milling Machine. Complete specifications in catalog No. M-1607-2.

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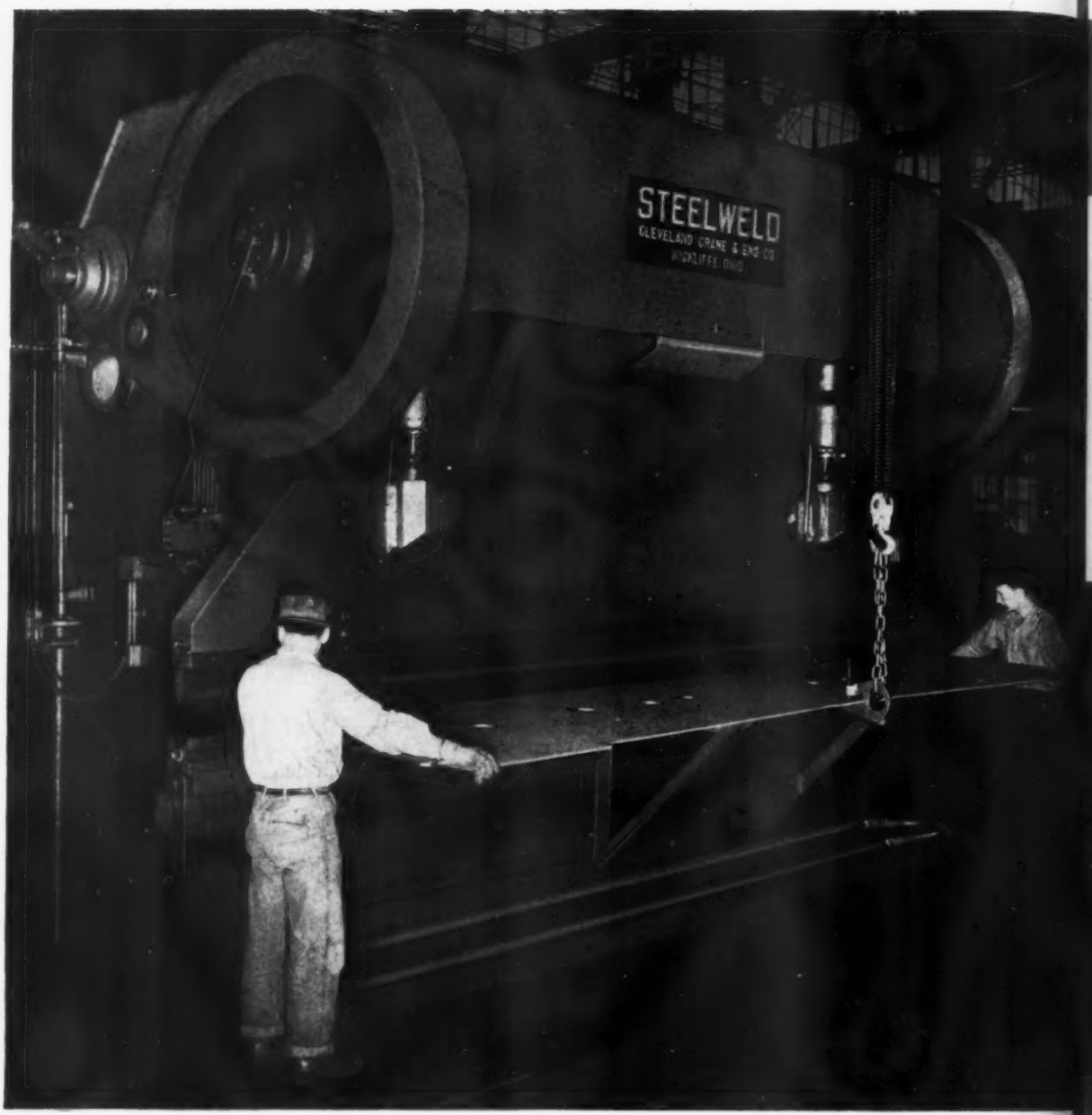

Reversing Ram Makes Die Changes Easy

This ruggedly built press is an operator's delight. It is provided with a reversing ram drive which permits backing the ram or upper die away from the work at any point in the stroke.

Since parts are produced in small quantities on this press, the dies and machine settings usually must be changed many times during a day. The reversing ram and other fine features make this work easy and fast for the operators.

This press is rated at ½" x 14'-0" mild steel but will bend plate to 18'-6" long that can clear the 18" deep throat.

No Other Shear Has So Many Important Features

Operators in hundreds of plants all over the country have acclaimed the ease of operation of Steelweld Shears. They like them because they have features that ease their work and make for accuracy. Steelweld is the only pivoted-blade shear on the market. No other shear has the wonderful MICRO-SET knife adjustment. Every Steelweld Shear is provided with fatigue-reducing electric foot switch control as standard equipment.

This shear is rated at 10' x 1".

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- Single-Point Presses
- Two-Point Presses
- Four-Point Presses

(Single and double action types)

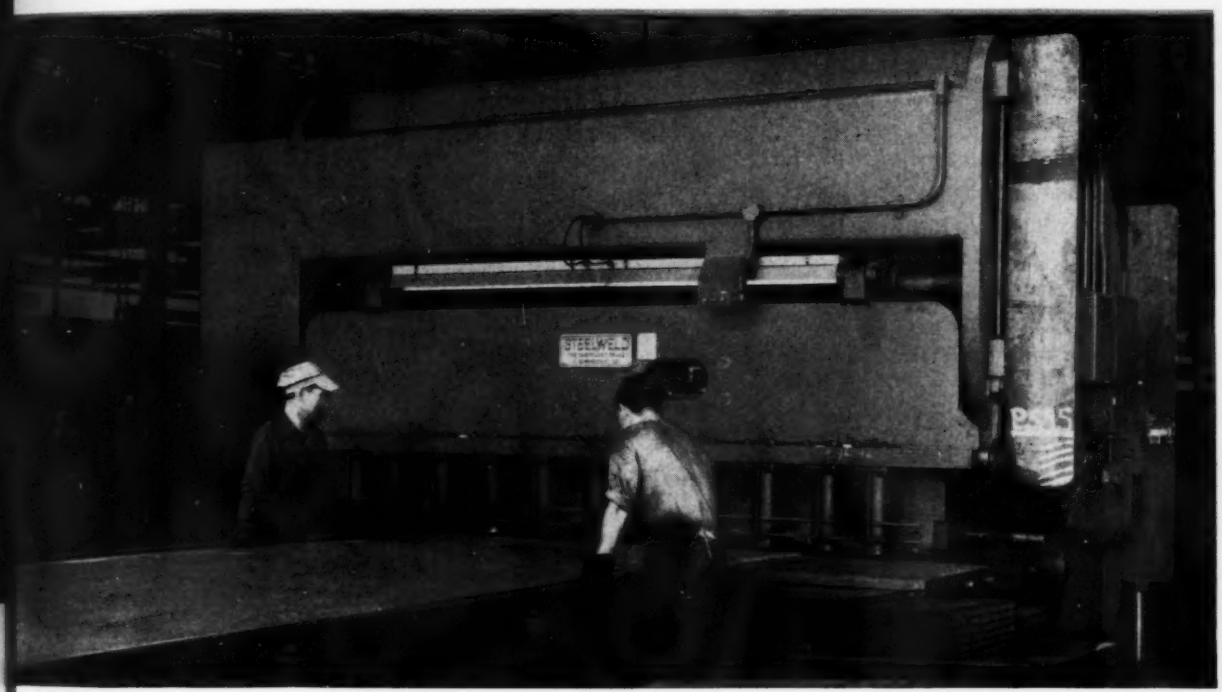
- Air Cushions

Operators LIKE STEELWELD MACHINES

THE MAN who operates a machine day in and day out usually gets to know it pretty well. If he has worked on various make machines, he is in a position to compare. He knows the good as well as the weak points. He can tell you what machines make his job easiest, what produce the most, what require the least maintenance. We have great respect for the operators and listen to what they say.

What we have been hearing about Steelwelds has elated us greatly. Briefly it is this: The operators have high regard for Steelwelds. They like their ease of operation which leaves them fresher at the end of the day. They approve the various adjustments with which Steelwelds are equipped and the simplicity of making them. They applaud the fact that the machines will operate continuously for long periods without need of attention.

The combination of the above factors, namely: Ease of operation, high production, excellent performance, and low maintenance, is hard to beat and accounts for the ever increasing popularity of Steelweld Presses and Shears.



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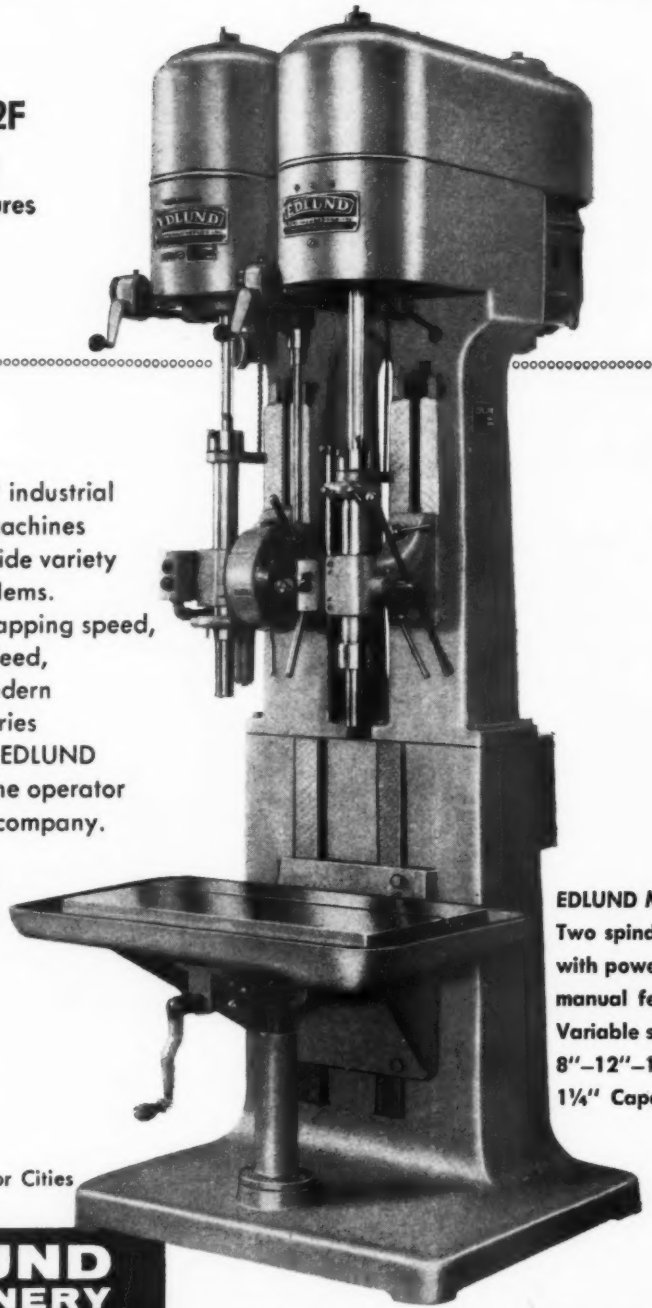
Modern Production Features
Long Lasting—
Rugged Construction



The changing pattern of industrial production requires machines readily adaptable to a wide variety of production problems. Selection of **any** drilling or tapping speed, manual or power feed, and many other modern production accessories make operation of the EDLUND Model 2F a pleasure for the operator and good sense for the company.

Write for Bulletin 140R.

EDLUND Model 2F
Two spindle combination with power feed and manual feed.
Variable speeds to 3600 rpm
8"–12"–15" Overhang
1¼" Capacity

EDLUND Representatives in Major Cities

EDLUND MACHINERY COMPANY
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Write for Bulletin G56 — Complete Line with Cam Feed Units
Bulletin 160 — Model 1F–High Speed
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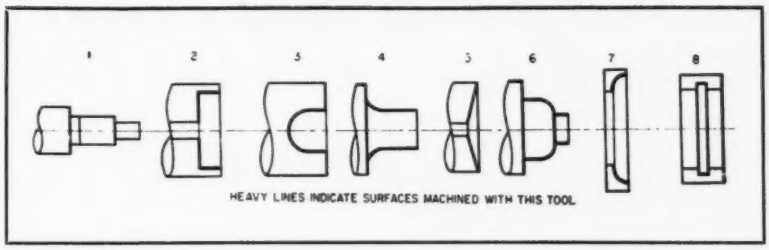
CIRCLE INFORM-A-GRAM KEY NO. 112



PROFILE TURNING SLIDE FOR SHORT RUNS

S. R. Rosen, chief engineer of the U. S. Automatic Corporation, Amherst, Ohio, has received his third award from the Technical Papers Subcommittee of the National Screw Machine Products Association. His latest award was for his paper on the design of a profile turning slide.

The profile turning slide was originally designed for the specific job for single point cutting of a ball seat. Once that job was completed, other uses were sought for the tool and since then it has had broad application in the U. S. Automatic plant. Now regarded at the plant as a standard tool, it is used particularly for those short-run jobs which require both close tolerances and good finishes.

When the slide is to be used, it is mounted on the turret under a 45° angle. Either of two places can be used for the placement of the tool depending on the part to be made. The cam follower is then screwed in the upper slide which is spring loaded; the downward travel is limited by two stop nuts. The cam itself is secured in a fixture of the cross-slide.

In preparing the unit for operation, the job must be set up so that the tool starts cutting on the bottom of the part and the cutting is continued until the tool reaches the center. When the center is reached, a stop knob halts the operation, the slide is locked, and the turret moved away. The tool is then ready for the next cycle after the stop knob is released.

In one instance, however, the slide should not be locked while moving away with the turret. This is in the case of "O" ring grooves. The reason for not locking in this instance, is that the slide is permitted to lower.

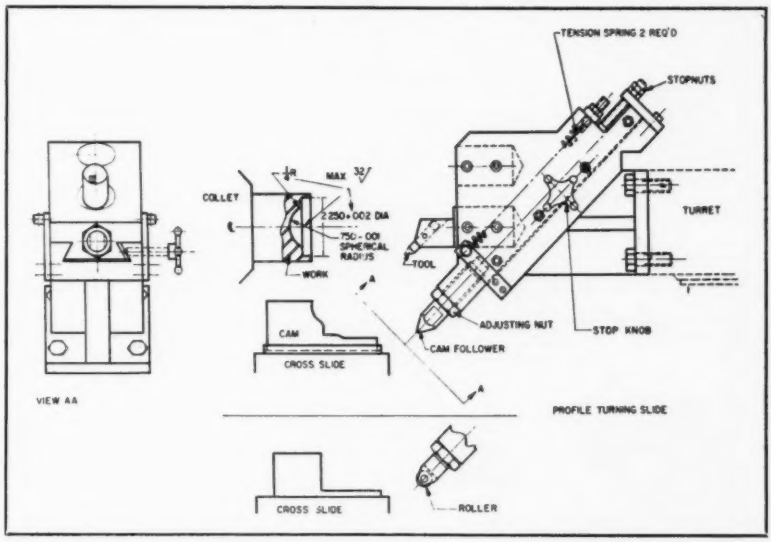
One distinctive difference should be noted between internal and external profile turning. In the case of the former, the cam confirms the outlines of the internal profile, and the tool is set in a boring bar just as a regular boring tool would be. However, in the case of external profile turning, the cutting tool is similar to a knee tool and the cam corresponds to the profile of the upper portion of the work.

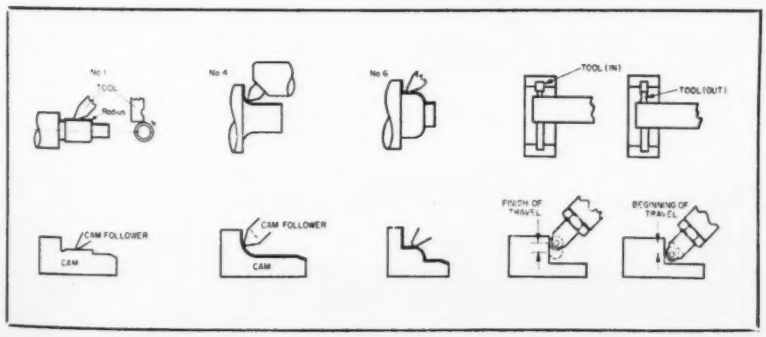
The cam, in the case of grooving, consists only of a straight vertical block. This is illustrated in the drawings representing two different views, the beginning of the travel and the finish of the travel for internal grooves. It can be noted from the drawings that while backing up the hex turret, the grooving tool clears down to the end of the pre-set slide limit and then moves out.

The various types of work that are possible with the profile turning slide are also illustrated in the series of drawings.

In announcing the award to Mr. Rosen, the committee indicated that the awards would be continued for all papers submitted and worthy of publication on any phase of the screw machine products industry be it technical, administrative, sales or pertaining to any other department or operators.

The NSMPA program is designed to stimulate interest in the exchange of engineering and business information for the benefit of industry as a whole.





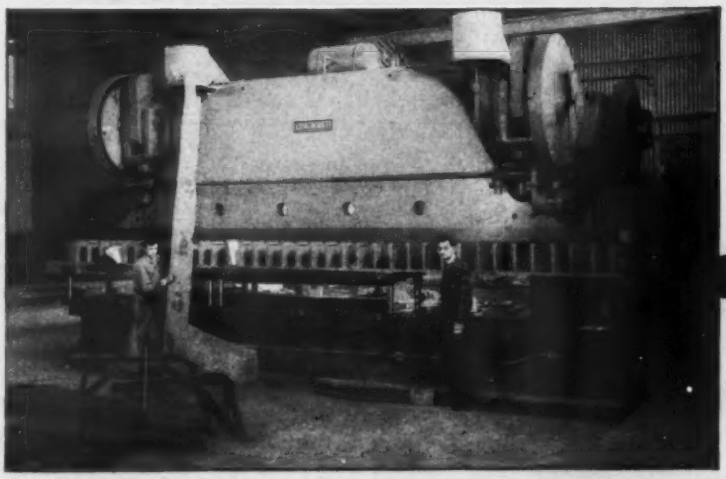
70 minutes cut

on combined blanking and punching operations!

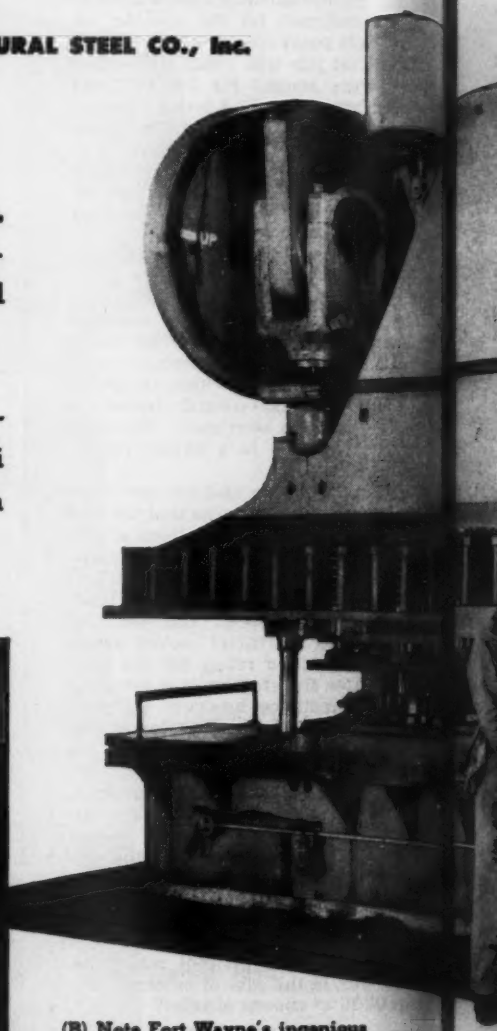
—**FORT WAYNE STRUCTURAL STEEL CO., Inc.**
Fort Wayne, Ind.

This versatile Cincinnati All-Steel Press Brake, 34 Series x 16′, has revolutionized the production of these long motor truck side rail reinforcements.

Check with our Application Engineering department on the use of a versatile Cincinnati All-Steel Press Brake in your shop. It can sharply reduce your production costs.



(A) Blanking floor to floor time 1¼ minutes. Previous time 34 minutes.



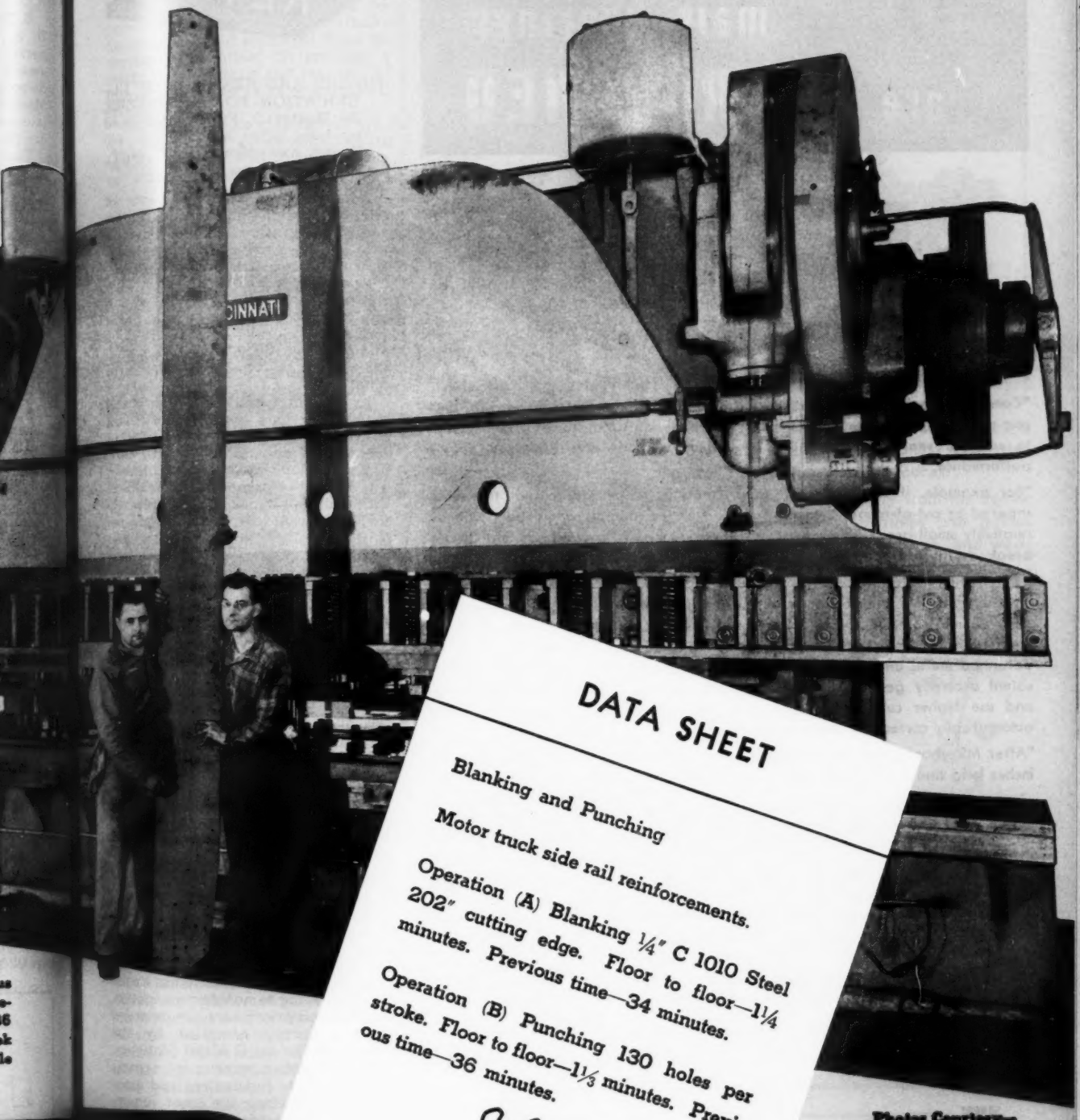
(B) Note Fort Wayne's ingenious punching equipment which reduced punching time from 36 minutes to 1¼ minutes and took advantage of every versatile Cincinnati feature.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

t to 2.6 minutes...



DATA SHEET

Blanking and Punching

Motor truck side rail reinforcements.

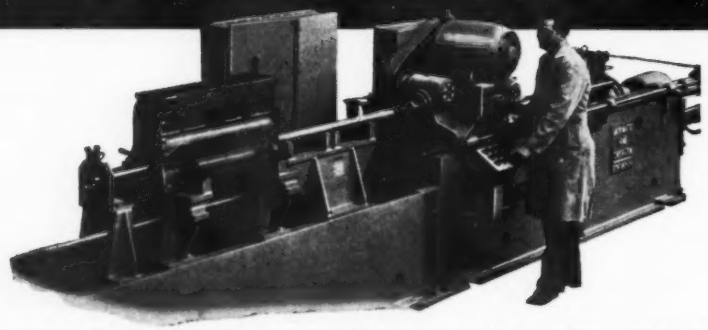
Operation (A) Blanking ¼" C 1010 Steel 202" cutting edge. Floor to floor—1¼ minutes. Previous time—34 minutes.

Operation (B) Punching 130 holes per stroke. Floor to floor—1⅓ minutes. Previous time—36 minutes.

John L. Hayner
President

Photos Courtesy—
FORT WAYNE
STRUCTURAL STEEL CO., Inc.
Fort Wayne, Indiana

WHY CUMMINS main bearings are MICROHONED

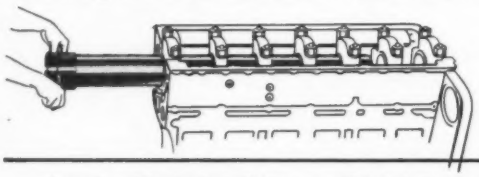


"Cummins diesel engines have a world-wide reputation for dependable, low-cost power. Here at Cummins, we attribute the wide acceptance of our engines to constant searching for better processing methods and improved engine performance.

"For example, if our crankshaft main bearings were undercut at the ends, tapered or out-of-round, then the full load of the journals would be borne by relatively small areas. This would cause bearing inserts to overheat and quickly break down. Also, should the bearings be misaligned, the crankshaft would flex during rotation and cause fatigue failure.

"However, by Microhoning our main bearings we secure *round, accurately-sized* and *aligned bores.* Cummins is the first diesel manufacturer to Microhone its main bearings. The surfaces of Microhoned bearings are clean-cut, free of deformed metal and the finish is consistent in every bore. In addition, the consistent accuracy generated by Microhoning permits us to make faster set-ups and use higher cutting feeds on preceding boring operations—Microhoning automatically corrects all inaccuracies.

"After Microhoning, all main bearing bores are checked with a gage plug 44 inches long and .0007 inch under required bore size. Gage must have a simultaneous slip-fit through all bores in the block. Tolerance for roundness is less than .0002 inch and finish is held to the specified 55 microinches."



Learn how Microhoning will give you efficient stock removal, closer tolerances, accurate alignment and functional surfaces.

☐ Please have a Micromatic Field Engineer call.
☐ Please send Micromatic literature and case histories.

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CIRCLE INFORM-A-GRAM KEY NO. 116

BOOK REVIEWS

THEORY AND PRACTICE OF LUBRICATION FOR ENGINEERS, By Dudley D. Fuller. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1956. 423 pages, $10.50.

Ranging from basic concepts of friction and lubrication through their correct applications, the book carries through three major objectives. Dr. Fuller systematizes and generalizes the principles, demonstrates the wide range of usefulness of lubrication analysis in solving engineering problems, and clarifies the restrictions and modifications of lubrication theory that are vital to its successful application.

In keeping with his aims, the author develops hydrodynamic and hydrostatic theories from simple and readily understood principles, employing the easiest methods possible. The restrictive assumptions on which the hydrodynamic and hydrostatic theories are based receive emphasis, as does hydrostatic lubrication, and hydrodynamic action is generalized and applied to many different geometries.

Individual topics covered are: fundamentals of viscosity and flow, viscosity and its variables, hydrostatic lubrication, hydrostatic squeeze films, hydrodynamic lubrication, hydrodynamic lubrication of journal bearings, friction and power losses in journal bearings, typical industrial bearings, air-lubricated bearings, dry friction, boundary friction, and bearing materials.

YEAR BOOK OF THE AMERICAN BUREAU OF METAL STATISTICS, Thirty-Fifth Annual Issue for the Year 1955. Published by the American Bureau of Metal Statistics, 50 Broadway, New York 4, N. Y., 1956. 128 pages, $3.

World-wide production and consumption and other economic statistics pertaining to non-ferrous metals, for 1955 and prior years, are recorded in this survey compiled by the American Bureau of Metal Statistics. Numerous other government departments, private institutions and associations, including the most important producers of copper, lead and zinc in the U. S., Canada, Mexico, Chile and Peru, also sponsored the work.

Tables of metal prices and duties, and lists of metallurgical plants and their capacities, round out the survey.

"FIVE-MINUTE SAFETY TALKS FOR FOREMEN," by Roland Blake. Published by National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill., 1956.

This new volume, Book 6, like the previous volumes, contains 52 talks designed to build sound attitudes on accident prevention. It provides a ready-to-use outline and text for informal safety pep talks or scheduled sessions.

The talks include material on general topics such as attitudes, lifting and first aid, as well as information on specific problems including the use of power tools, flammable liquids and electricity.

A MANUAL OF PROCESSES FOR THE COLD BENDING OF METALS AND ABRASIVE CUT-MACHINING OF METALS, Revised. Published by Wallace Supplies Mfg. Co., 1304 Diversey Pkwy., Chicago 14, Ill., 1956. $2.50.

This is a revised, two-section, ring-fastened book on two little-known processes.

The Cold Bending section presents a general discussion on bending and making bends, and describes types of machines and tools for cold bending tube, pipe and structural shapes. Designing for bending and the theory of cold bending are topics of other chapters in this section.

The Abrasive Cut-Machining of Metals deals with why abrasive wheels sometimes fail and how to prevent this, and what abrasive cut-machining will do. It tells of speed in cutting, quality of cuts and how abrasive cutting can cut material not otherwise cutable.

For users and potential users of bending equipment or abrasive cutting equipment, this well illustrated book can be a valuable reference.

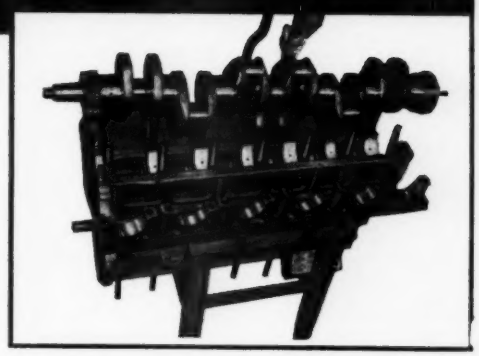
INDUSTRIAL VISION, by Dr. Henry W. Hofstetter. Published by Chilton Co., Philadelphia 39, Pa., 1956. 187 pages, $10.

The fact that 72% of the 75,000 disabling eye injuries each year in the U. S. occur on jobs regarded as non-hazardous, points up the need for increased knowledge and training relative to industrial vision.

Dr. Hofstetter, director of Indiana University's Optometry School, covers the whole field of industrial eye hazards and protection in this book, including the relation of vision, visual testing and visual skills to industrial performance, production and safety. Also covered are industrial eye hazards and protective programs, methods of evaluating efficiency for compensation purposes, and vision in relation to automobile and truck driving.

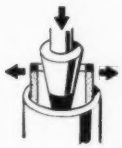
Plant managers, safety engineers and personnel managers, particularly, should benefit from the book.

HOW MICROHONING generates round, accurate, aligned bearing bores



All types of cylindrical surfaces, including small diameters and combinations of soft and hard metals . . . interrupted by keyways, undercuts, ports, reliefs or cross holes . . . can be economically Microhoned to precision tolerances and alignment.

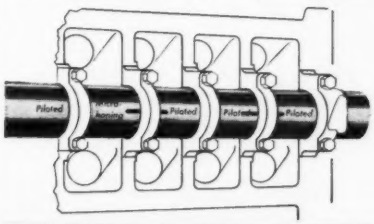
A typical example of Microhoning interrupted cylindrical surfaces is the Cummins Diesel Engine application. Here's how Microhoning generates accuracy and alignment in the crankshaft main bearing bores:



1. Cutting pressure is applied radially from the center of the Microhoning tool body. Abrasives and guides both are expanded by the same feed force, and wear at the same rate.

2. Abrading action is divorced from the effects of spindle or driveshaft vibration and misalignment by a universal joint that is between tool body and driveshaft.

3. The single bank of abrasives travels through all bores on every stroke. As abrasives are Microhoning one bore, the tool is piloted by the plastic guides in the other bores.



The principles and applications of Microhoning are thoroughly explained in a 16mm, 30-minute sound movie, "Progress in Precision". We'll be glad to reserve a print for your use.

☐ Please send me "Progress in Precision" in time for showing on _____ (date).

☐ Please send Microhoning literature; I am interested in the following application _____

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MICROMATIC HONE CORP.

8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 117

ACCURATE GRINDING ...

of machine ways

ONE TRIUMPH OF MODERN GRINDING is the facility with which some of the larger surface grinding machines are capable of finishing machine ways.

With the rise of the flame-hardening process 25 or 30 years ago, and with its continually-increasing applications, more and more machine tool ways are being surface hardened by this process. Where ways are preliminarily flame hardened, there is no question of a choice as between grinding and scraping. Grinding becomes the only possible method of finishing.

Even where the flame hardening process is not considered or used, many companies have eliminated the hand scraping operation on machine ways. Suitable grinding machines, like those built by Mattison Machine Works, have demonstrated their ability to do the job at remarkable speed and with such a high degree of accuracy, in reference to both straightness and parallelism, that the method easily wins its way with progressive production men. A notable economy is realized where modern grinding methods are substituted for hand scraping.

A great deal of way grinding is performed with standard horizontal-spindle surface grinders. These machines are particularly well adapted for use in grinding flat ways and also v-ways. Some of the wide-faced wheels employed on these machines can be dressed readily to the proper angle on both sides for grinding both male and female v-ways. It is obvious, also, that where both are ground with the same wheel, the angles will match perfectly. Enough of the wheel can be left straight across the center of its face for grinding such flats as are involved, thus handling both flat surfaces and v-ways on the same workpiece at the same setting.

Where intricate and undercut ways are to be ground, special way grinding machines are available. Some of these units are equipped with a nominally vertical spindle carrying a flared wheel. However, the spindle, though nominally vertical, has a tilting adjustment, making it suitable for grinding different angles as need may appear.

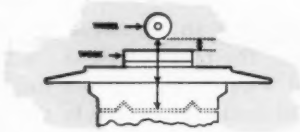
Capacity of some horizontal-spindle machines, both in regard to weight they will accommodate on the travelling table and the amount of clearance obtainable between the periphery of the grinding wheel and the machine table surface, is remarkable. This allows the processing of ways on high machine bases. Heavy machine-base castings are often mounted, and their ways properly ground in a single setting on such machines.

end

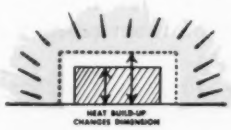
A modern Mattison grinder finishes the flat tops of ways on a 3000-lb base casting for an open-side shaper. The casting is 34" high, yet the grinder provides adequate clearance for handling it.

DoALL Takes the Guesswork out of Surface Grinding

The DoALL Maintains Wheel Diameter. The leading edge of the wheel takes the brunt of the cutting. The edge wears but the wheel face and diameter remain intact, assuring accurate stock removal. This is achieved by machine rigidity, smooth table travel and cross feed occurrence before the wheel contacts the workpiece.



The DoALL Maintains Table-to-Wheel Distance Under Load. Absence of spindle and saddle deflection plus a constant thickness oil film on all hand scraped ways assures parallel work travel under the wheel.



The DoALL Minimizes Thermal Expansion. DoALL "Cool-Grinding"* (coolant through the wheel) plus flood cooling controls workpiece temperature, minimizing expansion which produces undersize dimensions when work cools. Cool-Grinding helps to keep wheel cutting free, permits heavier downfeeds without burning or checking the workpiece and reduces the frequency of wheel dressing because diameters are maintained for longer grinding periods.

You get more output per hour because you don't have to stop to check dimensions . . .

The amount of work produced on a surface grinder depends on whether its feed calibrations represent an equivalent amount of stock removal. To grind, measure and then grind some more to secure final dimension is a costly waste of time.

DoALL takes the guesswork out of surface grinding because the wheel removes stock exactly according to downfeed setting. This reliability does not exist in all surface grinders. An accurate handwheel alone does not make an accurate surface grinder. Nor can accuracy be determined except under the stress of grinding, as illustrated at the left.

For true precision grinding with greatest output per hour, there is nothing to match a DoALL.

ASK FOR A FREE DEMONSTRATION — Compare a DoALL with any surface grinder in your shop. See it in operation on a DoALL demonstration wagon right in your own plant. Call your local DoALL Store or write:

The DoALL Company,
Des Plaines, Illinois

Ask for Grinder Catalog

38 local DoALL Service Stores offer free demonstrations.

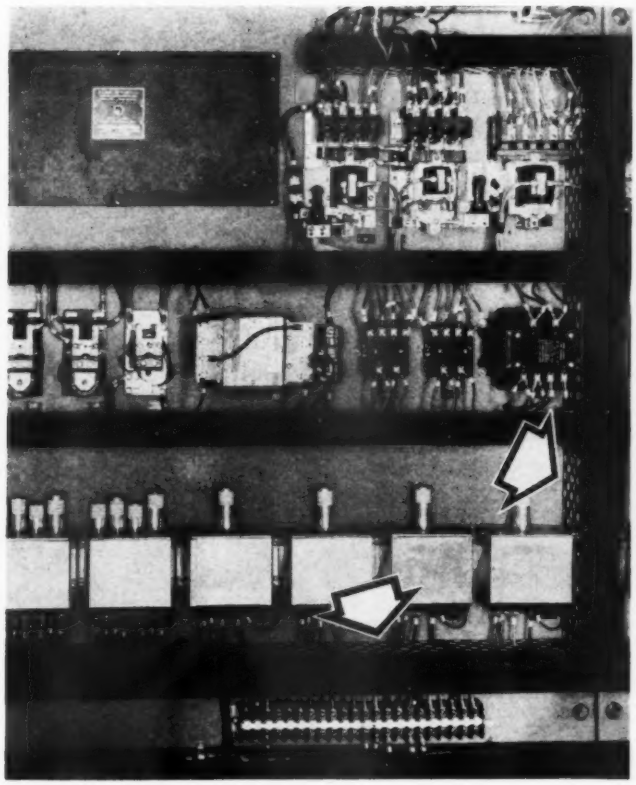
DoALL

*U. S. Pat. No. 2470350

GR-16

CIRCLE INFORM-A-GRAM KEY NO. 119

Fiberglass Wiring Channel-Ducts for Control Panels



PROVEN by two years of successful use in the control panels manufactured by a nationally known producer of industrial electric drives, Glastic Channel-Duct now offers to manufacturers a more convenient method of locating and holding wires between components. These ducts eliminate the need for expensive harnesses or solid-wire layouts and simplify maintenance thru ease of wire-tracing and replacement.

These ducts are made up of three panels — two side members punched with ½″ dia holes, and one solid cover strip. Easily installed clips provide the means for anchoring the ducts inside control cabinets.

The material is a fiberglass-reinforced polyester laminate which has UL recognized flame-resistance to 105°C, high impact strength, resistance to warpage, stability under continuous heat and humidity, and superior arc resistance. It has a dielectric strength of 5000 volts minimum between side strip holes.

Case History: The manufacturer of motor control panels had the problem of finding a more convenient method of locating and holding wires between control components. This problem developed because the control panel designers were spending an excessive amount of time determining the proper layout for the hand-formed solid wire, running from the relay to the terminal board and back to the relay, so that the best appearance could be obtained and at the same time avoid crossing wires.

It also required skilled personnel to cut and hand-form each wire and then mount it on the panel to conform to the exact position shown on the wiring diagram.

This neat wiring job was disrupted every time it was found necessary to make an application change or an improvement was required which affected the control wiring layout, and it was most often impractical to attempt to restore it to its original position.

The solution was found in the adoption of Glastic channel-ducts which made possible the replacement of hand-formed solid wire with flexible wiring. The manufacturer is now saving over 30% in control panel manufacturing costs, plus greater installation flexibility and maintenance savings to the customer.

Glastic channel-ducts were developed by The Glastic Corporation, 4321 Glenridge Rd., Cleveland 21.

end

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OFF THE SHELF!

ALL TYPES ...
ALL SIZES ...
ALL SHANKS ...

SUBLAND

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- DRILL COUNTERBORE
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Delivery in Ten Days

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MOHAWK TOOLS, INC.
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worlds largest producer of Sublands

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Enduring Craftsmanship in Metal

Skillfully crafted by Connecticut's master clock makers in the 1850's, this timepiece is still measuring the hours dependably and accurately after nearly a century of service.

MILFORD metal cutting saw blades are also famous for accurate, dependable performance and are the result of painstaking craftsmanship.

To insure the finest in service as well as in product, buy MILFORD Blades through your local Industrial Distributor; save time, cut buying costs, reduce expensive inventories.

Hack Saw and Band Saw Blades • Hole Saws • Ground Flat Stock

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THE HENRY G. THOMPSON & SON CO.
Saw Blade Specialists for 80 Years
NEW HAVEN 5, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 122

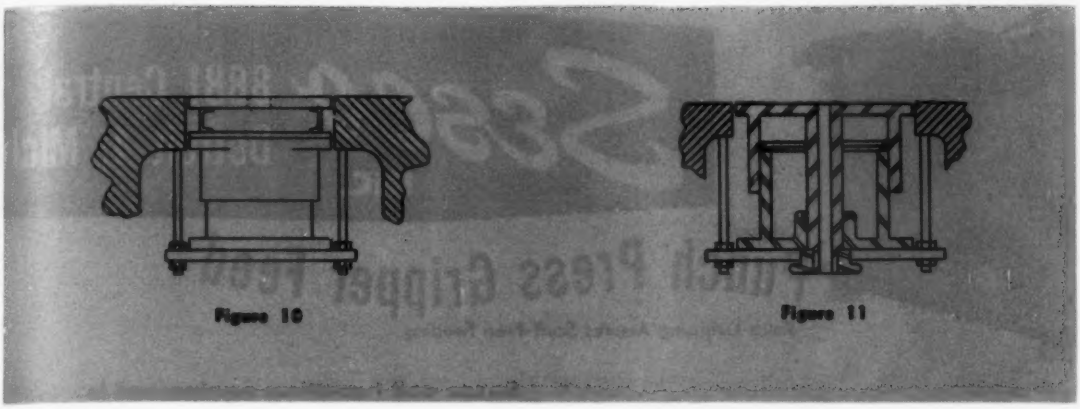

Figure 10 Figure 11

... Continued from Page 108

in construction and performance to meet and solve the problem of increased tonnages within a given space.

Shown also in Figure 6 is the means of obtaining this increased pressure. Shop air line pressure is channelled through an especially designed booster pump which requires no external source of power than the air to be compressed. This unit will boost pressures to any desired volume up to two times the input pressure.

Under certain circumstances more tonnage is required than can be obtained by the aforementioned cushion. In this case the pressures within the cushion became so great that a non-compressible substance, such as oil, must be employed from a safety standpoint. The result is a hydro-pneumatic cushion as shown in Figure 7. In this design the resistance during the draw is obtained from a combination of air and hydraulic pressure. The stripping force is obtained from air pressure alone. This particular design offers maximum area for the stripping pressure to operate on and hence gives maximum stripping force.

Industry still requires special cushions frequently to fit their particular needs. Some examples are shown here. Figure 8 pictures a cushion with extra long overlap to compensate for any off-center loading which might be placed on the cushion.

Figure 9 shows the center guiding stem as applied to the latest type design. This enables the cushion to be infinitely adjusted for height within a given range so that variations in pin length, bolster thickness and dies can be compensated for. Figure 10 shows a raised pin pad applied to a standard cushion to obtain slug clearance, or, in some cases to fit a particular press with a cushion larger than that which will fit in the bed.

The cushion in Figure 11 is designed with a hole through the center so slugs can drop all the way through to the area beneath the cushion. Figure 12 pictures the construction details of a similar cushion. From this presentation it can be seen that the die cushion industry, like so many others, has evolved to its present state through many years of designing to meet the needs of the industry which it serves.

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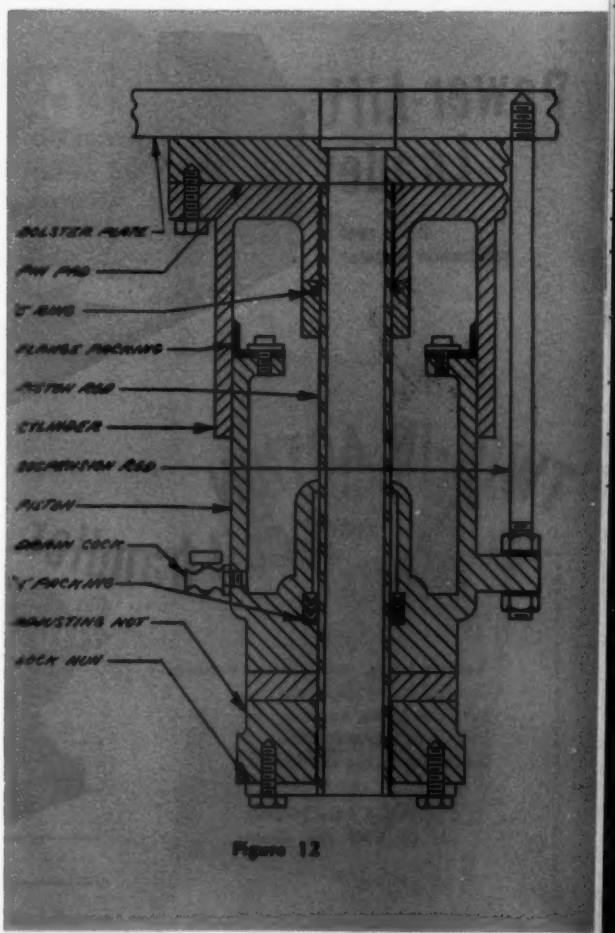


Figure 12

Sesco INC.

8881 Central
Detroit 4, Mich.

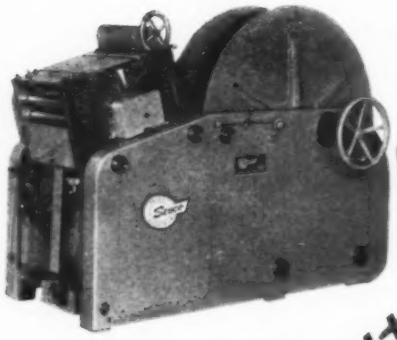
Original

Punch Press Gripper Feed

Pinch Gripping Assures Scuff-Free Feeding

Sesco coil handling equipment is completely powered at a controlled rate to customer specifications

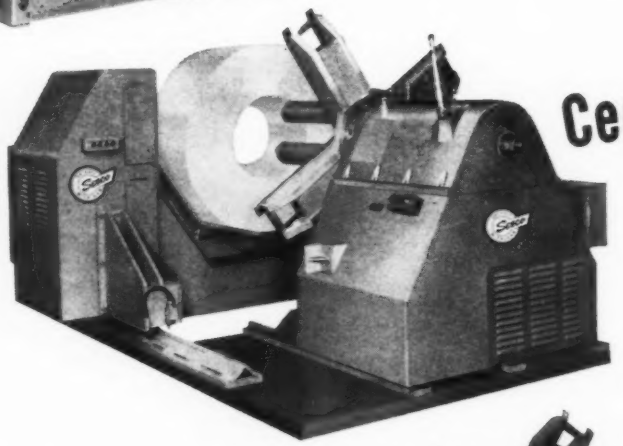
Cradle or Straightener available as separate units



Combination Cradle and Straightener

Power-Lift Loader

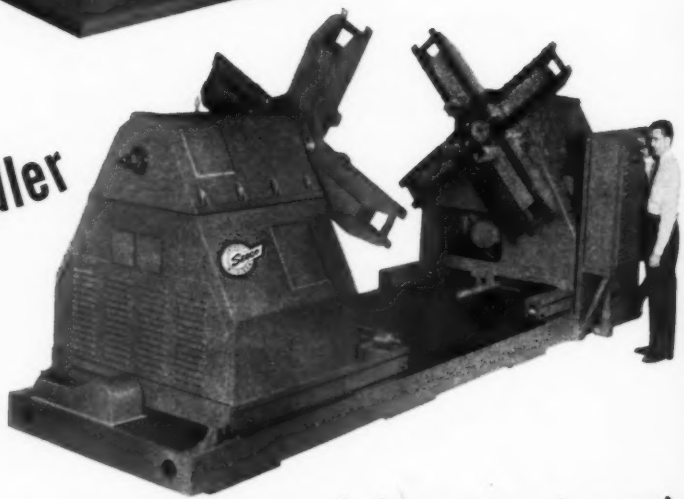
It's a real production booster



Centering Reel

The first of its kind

TWIN-IN ACTION coil handler



Sesco's broad experience enables its staff to render assisting services in the handling of coils and parts for the metal stamping industry

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engineers & manufacturers of machine tools and press room equipment

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THREADWELL'S New
TAP PRIMER

—for the newcomer to the metalworking field an introduction to the science of tapping explained in simple terms.
—for the old hand, a convenient refresher and reference.
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I'd like .....copies of the new Tap Primer.

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Ask your Diemaker !*

** We jumped from 16,000 to over 60,000 pieces per grind with*

Darwin PRK • 33 TOOL STEEL

This profit-making story from a Philadelphia Tool & Die Shop is what **you** can expect when you specify Darwin PRK-33 Tool Steel. Here's why! By adding Cobalt to Darwin PRK-33, a secondary hardness is achieved which makes the improved and hardened steel ideal for tools and dies which must undergo long runs at high temperatures. In addition, PRK-33 Cobaltcrom is one of the few steels which **grind super-keen** as well as being unsurpassed for dies which require a perfect edge for eliminating flash. No wonder **the expert diemakers** look to PRK-33 when they want to increase die life and reduce regrinds! So why not call or write for information on the complete line of Darwin Tool Steels today! You'll be money ahead!

Broach dies of PRK-33 Cobaltcrom Steel

Complete line of highest grade Tool Steels, including PRK-33, DARWIN No. 1, NEOR, MINEOR, OHT, "MT6" and various grades of Hot Work Specialty Steels. Furnished in Bar Stock, Billet and Sand Casting, Drill Rod, Flat Ground Stock and Tool Bits. Bulletin on Request.

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highest grade tool steels

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FILMS TO SEE

Several sound films are now available from The Sheffield Corp., Dayton 1, O., or through its branch offices and representatives. Included are "Precision for Production" covering the elementary circuitry of both the air flow and back pressure principles of air gages, and "Air for Every Gaging Job" which details the field of application of air gages and circuitry of the tooling. The film, "Report from Industry," shows the use of air gages in all types of industry from the simple single dimension gage through the multiples for gaging up to 30 dimensions simultaneously. All these movies are 15 min long.

"Hobs and Hobbing," demonstrating new techniques in gear cutting, has been released by Barber-Colman Co., Rockford, Ill. This is a 20-min sound-color film which is made available on loan by the company.

How cutting fluids work to cut down the harmful effects of heat and friction created during the metal-cutting process is shown in "Cutting Fluids." After a discussion of how a cutting tool works, the film is divided into two parts — cutting oils and water-based emulsions (solubles). This 19½-min color-sound movie is issued by The Texas Co., 135 E. 42nd St., New York 17.

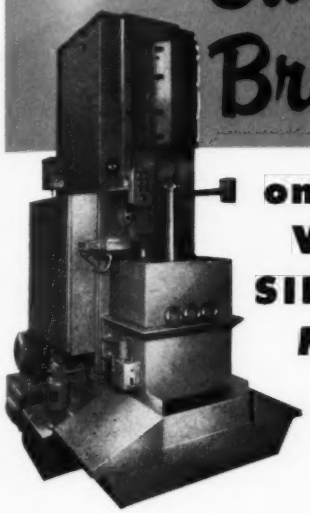
"The Miller That Uses Its Head" points out some of the many applications of the hand miller having a "rise-and-fall" spindle head. An analysis of the hand miller from the tool engineer's and tool designer's point of view, the film shows many kinds of tooling and fixture designs, from simple stock fixtures to completely automatic fixtures. This 16 mm color-sound movie is loaned without charge by Nichols-Morris Corp., P. O. Box 430, White Plains, N. Y.

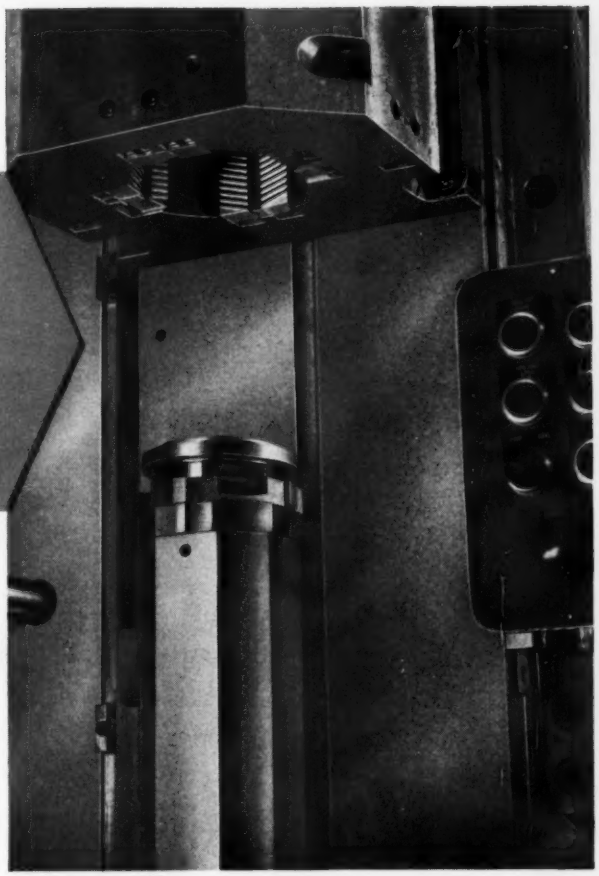
An automated press line which produces automotive wheels is the subject of the 16 mm color-sound movie, "Transflex — Automation in Action." Described in detail are the construction of the feed mechanism, the operation of the press line and the significance of the Transflex concept in press design. The film is supplied on a loan basis by Clearing Machine Corp., Div'n of U. S. Industries, Inc., 6201 63rd St., Chicago 38.

UNUSUAL TOOLING SETUP FOR

External Surface Broaching

on DETROIT VERTICAL SINGLE RAM MACHINE





This broaching job requires rigidity and perfect alignment . . . which makes it a "natural" for the massive Detroit Vertical, built and tooled by experts. Note the safety feature which prevents the main slide from descending until dual push buttons have been operated. This slide holds the heavy, pot-type broach holder in perfect alignment with the fixture post, which is mounted on a fixed knee for even greater accuracy.

Detroit Vertical Single Ram machines are available in standard capacities from 5 to 25 tons, stroke length from 30″ to 90″. Interchangeable knees with shuttle table mechanism can readily convert this machine into a standard for future production needs. Oversize platens on all standard models allow multiple as well as single station tooling.

Detroit builds every size and type of broaching machine, automates and tools them to fit your needs. Call in a Detroit field engineer, or send us details of your production problem . . . today.

PART—Automotive transmission component.

OPERATION—Broach 4 external lugs, equally spaced.

TOOLING—Pot-type broach holder, built in sections for convenient tool assembly . . . in perfect alignment with fixture post.

CYCLE—Operator loads work over fixture on top of post, starts machine. Broach holder descends with ram and bottoms after cutting stroke. Operator unloads work and presses palm button for return stroke.

PRODUCTION—120 parts per hour.

MACHINE—Detroit 10-ton Vertical Single Ram Broaching Machine with 42″ stroke and fixed knee.

Write for new free bulletin on Detroit Vertical Single Ram Machine

DETROIT BROACH & MACHINE COMPANY

DEPARTMENT E-10

ROCHESTER, MICHIGAN

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Precision Tooling

shortest route to COST REDUCTION

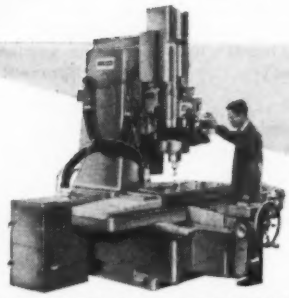
P & W

KELLER MACHINES

Producing an almost limitless variety of dies, molds, prototypes and other work, these automatic, tracer-controlled millers accurately reproduce the shape of any 2-dimensional template or 3-dimensional full model. Complex forms that cannot be machined economically — or at all — by other methods are produced quickly and easily by "Kellering."

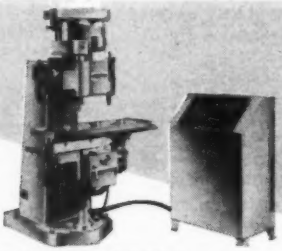
PRATT & WHITNEY COMPANY, INCORPORATED

MACHINE TOOLS • GAGES • CUTTING TOOLS



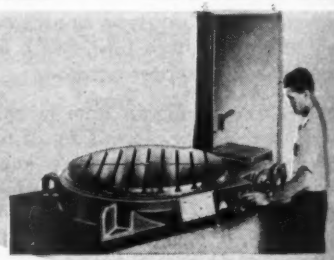
2E VERTICAL PRECISION HOLE GRINDER

"Tenths" accuracy plus grinding speeds to 100,000 rpm.



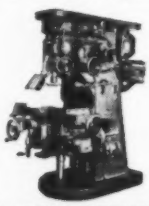
"VELVETRACE" MILLING MACHINE

Ultimate in accuracy for 3-dimensional tracer-controlled reproduction.



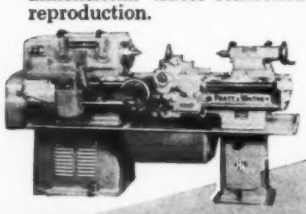
PRECISION ROTARY TABLES

Rugged, accurate to seconds! Automatic, plain, tilting and vertical types; 10" to 50" diameters.



PLAIN AND UNIVERSAL DIE SINKERS

Extra power and stamina to handle today's tougher die steels with speed, accuracy.



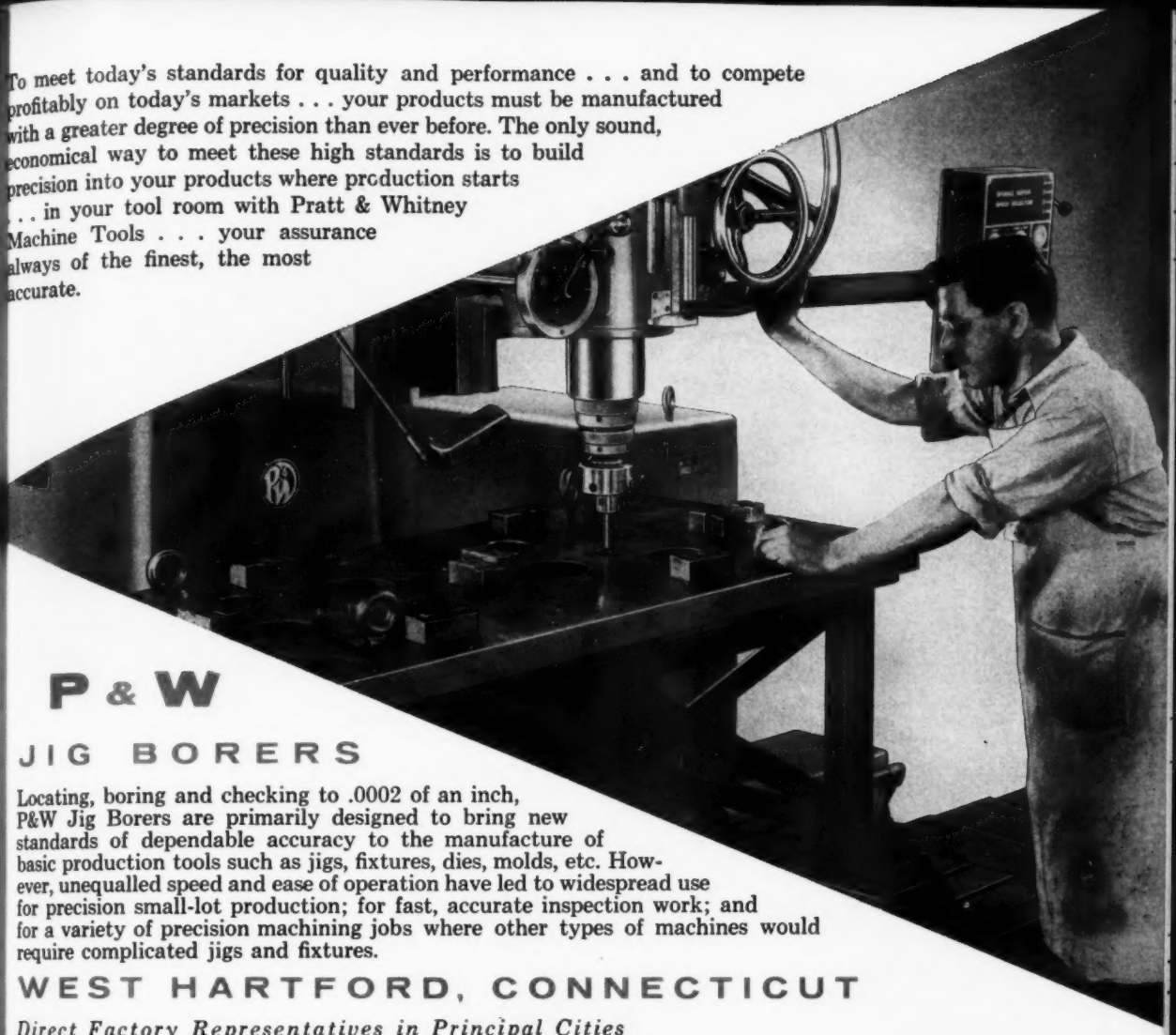
MODEL C LATHES

Traditionally the finest wherever highest precision is essential . . . now even better.

CUTTER and RADIUS GRINDERS

Grinds virtually every type of standard and special cutter . . . quickly and accurately.

To meet today's standards for quality and performance . . . and to compete profitably on today's markets . . . your products must be manufactured with a greater degree of precision than ever before. The only sound, economical way to meet these high standards is to build precision into your products where production starts . . . in your tool room with Pratt & Whitney Machine Tools . . . your assurance always of the finest, the most accurate.



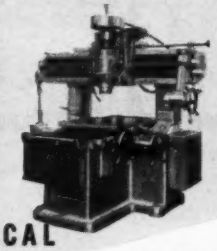
P&W

JIG BORERS

Locating, boring and checking to .0002 of an inch, P&W Jig Borers are primarily designed to bring new standards of dependable accuracy to the manufacture of basic production tools such as jigs, fixtures, dies, molds, etc. However, unequalled speed and ease of operation have led to widespread use for precision small-lot production; for fast, accurate inspection work; and for a variety of precision machining jobs where other types of machines would require complicated jigs and fixtures.

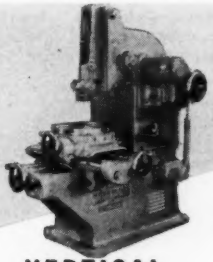
WEST HARTFORD, CONNECTICUT

Direct Factory Representatives in Principal Cities



VERTICAL MILLERS AND PROFILERS

Economical production profiling of irregular shaped parts.

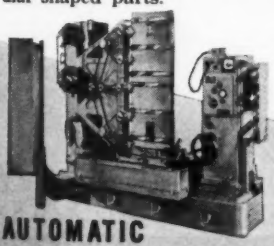


VERTICAL SHAPERS

Handiest machine in any shop for fast, accurate handling of irregular shaped work.

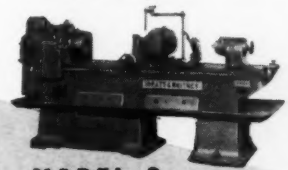
DIAFORM WHEEL FORMING ATTACHMENTS

Form-trues grinding wheels, accurate to "tenths" in minutes; saves time, money.



AUTOMATIC DUPLICATING MACHINES

Duplicates die and bottle mold sections . . . quickly, accurately, economically.



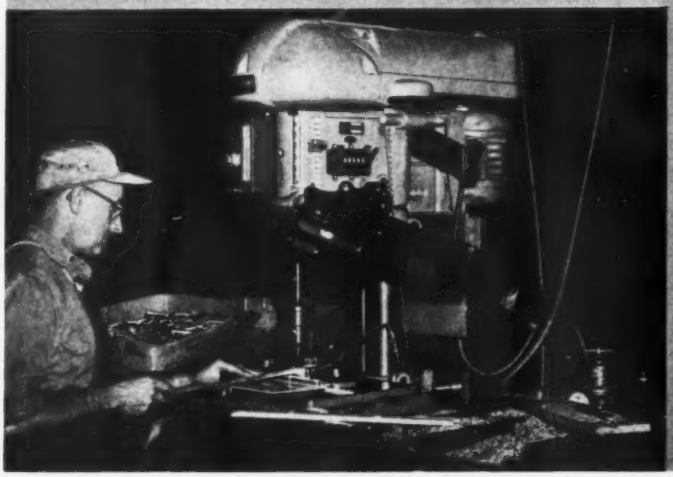
MODEL C THREAD MILLERS

Unusually versatile; sets new standards for accuracy, finish and economy.

DEEP HOLE DRILLERS

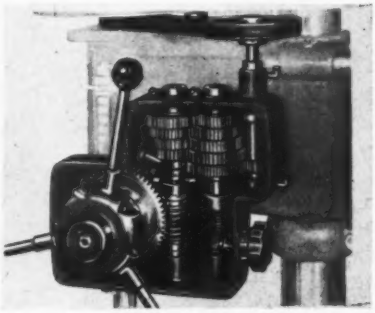
Twin drilling units produce true holes up to 129" deep in a single, uninterrupted operation.

It takes a HEAVY WEIGHT to do Heavy-Duty Drilling!

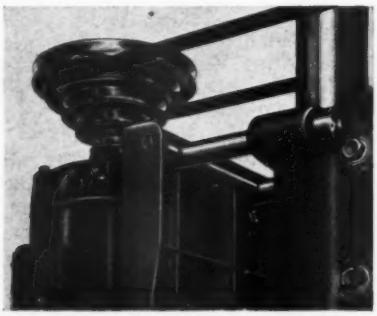


"Because of their heavier construction, CLAUSING 18" drill presses are the best producers in our plant. They increased production 22% over other drills previously used on same job!" — Valley Metal Products Company.

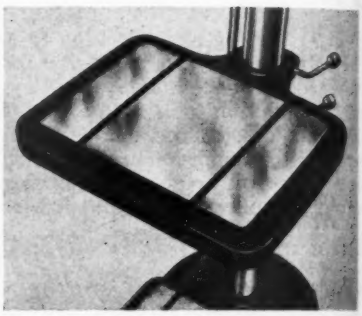
Head is larger and heavier than heads of comparable drills. Has the rigidity you NEED for heavy-duty work.



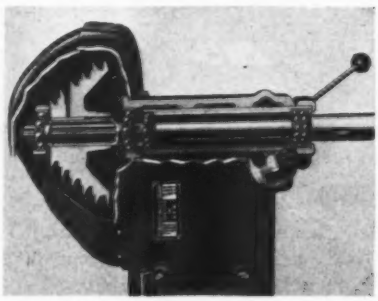
"CLAUSING drills have the best power feed in the industry." Gear driven, heavy-duty! No belts to dissipate power.



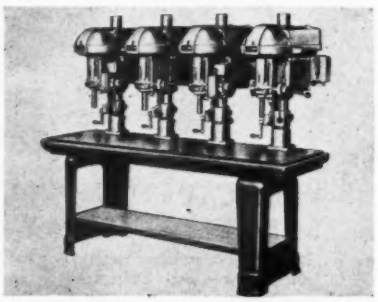
CAST IRON pulleys, 5-step, ⅝" B-section belt. Drive is positive — greater production — less down time, lower maintenance costs!



Massive tables, bases, and columns. For example, oil table alone weighs 95 lbs!



63/64" tough, precision-ground steel spindle! 6½" spindle travel! 5 ball bearings in head for lasting accuracy, service.



CLAUSING 18" multiple spindle drills have bigger working surfaces for handling big jigs and fixtures! 90¼" x 28¼". Table alone weighs 1100 lbs.

Yes, CLAUSING DRILLS have what it takes for BIG jobs!

Described here are only a few of their outstanding features that will pay out quickly in your plant. We'll gladly send you all the "weigh-in" facts on these heavy weights! Write for illustrated literature today.

15" ATLAS-CLAUSING DRILL PRESSES ALSO AVAILABLE

CLAUSING DIVISION, ATLAS PRESS COMPANY
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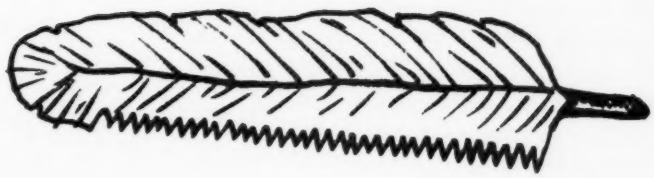
by ROGER PRICE

J&L



Bench Model BC-7D

Floor Model FC-30

Floor Model FC-14

Table Model TC-14
(Vertical Inspection)

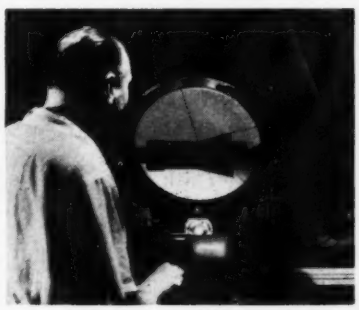
"INDIAN FILE"

The idea of anyone using a feather for a file sort of tickles me, in a way. But I'm puzzled as to what it was designed to do. My only theory is that it was the quill pen of an Apache ghost-writer with a light touch, who used it to take the rough edges off Geronimo's tribal speeches. If *you* have a better theory, send it to me, care of J&L. I'll send the writer of the best explanation an autographed tomahawk, an ideal instrument for cracking walnuts and keeping the kids in line.

Speaking of ideal instruments, I'd like to introduce you to the Jones & Lamson Comparator, which is an ideal instrument for measuring and inspecting all sorts of objects and component parts, in a variety of sizes and shapes.

The J&L Comparator is suited to both production-line and job-shop work, and is accurate to .0001". Its extreme flexibility enables you to perform inspections that are not possible by any other method. Eleven models available, in both floor and bench types. For complete details send this coupon *today*.

JONES & LAMSON OPTICAL COMPARATORS *On the Job...*



at Balas Collet Manufacturing Co., Cleveland, Ohio

Checking tapers and length from face to apex on stationary tool holder type collet.

Balas Collet Manufacturing Co. uses a J&L PC-14 Comparator to check both angles of the taper at one time, as well as the relationship between tapers. This has effected substantial savings over the solid type "Blue" gage method previously used.

JONES & LAMSON

JONES & LAMSON MACHINE COMPANY, Dept. 710, 519 Clinton Street, Springfield, Vt., U. S. A.

Please send me Comparator Catalog 402-C, which describes the complete line of J&L Optical Comparators.

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Conveyorized Press Line Ups Hub Cap Production

Draw and trim dies, hand loaded, are followed by two curling dies, chute loaded. Presses are tripped by interruption of light beams when workpiece is centered in dies. Five presses, three operators.

by Herbert Chase, M. E.

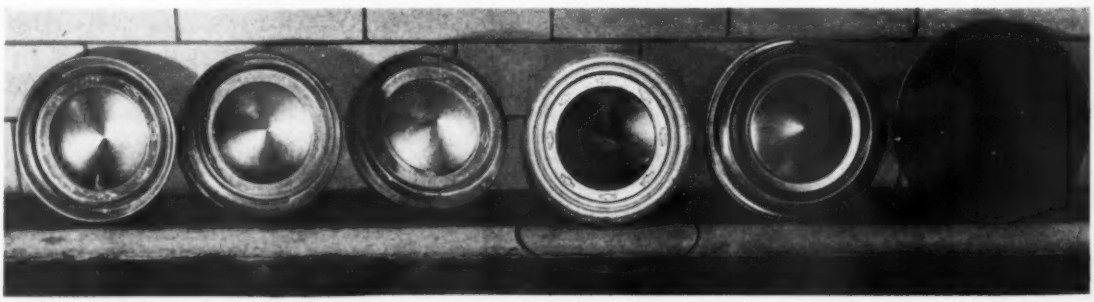
PRODUCTION OF HUB CAPS for General Motors cars is among the major activities of the Brown-Lipe-Chapin Division's new plant in Syracuse, N. Y. Hub caps for Chevrolet cars are produced at unusually high rates. Labor along the press line for these caps is minimized by partial automation. Although considerable manual handling is required, the setup enables this to be done rapidly and some dies are arranged to close automatically, yet safely, the moment that the workpiece is in place.

In Figure 1 are shown, from right to left, the circular brass blank and the hub cap stamping as it appears after each step in the production sequence. Brass blanks are purchased cut to size and are delivered to the draw press, Figures 2 and 3, where loading is done by a stick having a suction cup pickup at one end. This is used, partly, to keep the operator's hands well away from the die. Care is taken, of course, to avoid double loading, and as blanks are dry in the stack there is little tendency for them to stick together.

As Figure 3 shows, there is a tank of draw compound between the operator and the press and by dipping each fourth piece in the compound ample lubricant is kept on the die surfaces. Button tripping of the press is done and air ejection to a chute takes place when the die opens. This chute delivers the drawn part to the left hand of the operator at the trim press, Figure 4.

For the trim operation, the operator lifts the stamping with his left hand and places it in a chute that feeds the trim die which is caged except for chute openings. This loading chute is inclined enough for the workpiece to slide into the die where, because of its domed shape, the stamping centers itself before the operator presses the trip button and the press closes to

Fig. 1. Chevrolet hub cap as it appears during the successive press operations, starting with the brass blank at the right.



Logan

- 12" SWING
- 1" COLLET CAPACITY
- 1⅝" SPINDLE BORE
- 23" and 35" CENTERS
- VARIABLE SPEED OR DOUBLE V-BELT DRIVE

ACCURACY, CAPACITY AND POWER COMBINED IN THIS 12" LATHE

This 12" swing lathe typifies Logan advanced design and rugged construction. Gears are extra wide and strong. Shafts are extra heavy. The lead screw has a full ⅞" diameter. The precision carriage rides on a two-V-way, two-flat-way bed that is rugged, precision ground and warp-free. The heavy spindle turns on oversize ball bearings, no bearing adjustment needed for any speed between 38 and 1575 rpm. This lathe, and every Logan Lathe from 14" swing down to 9" swing, is dynamically balanced before it is shipped. The result is *sustained accuracy* and smooth, quiet power on every lathe turning operation. See your Logan Lathe dealer for more facts—or mail us the coupon below.

No. 2557-V
12" Swing,
Variable Speed Drive
35" Centers

THIS COUPON
will bring you full details on Logan Lathe construction and specifications.

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Why the Die Designer Prefers PRODUCTO Die Sets

He can specify Producto with complete confidence

The die designer likes to specify Producto die sets on his blueprints because they are a nationally-accepted "brand" They're easy to get anywhere.. and delivery is prompt.

He favors Producto because he knows he never has to compromise his die design. Even if the die layout is a little unusual, he will be able to select a die set to accommodate it from Producto's wide range of thicknesses and styles.

He also knows Producto has the equipment that can cut his tooling costs by letting him adapt his sets to a more economical *basic* design. Only Producto offers him complete foundry, pattern-making, welding and machining services for his special requirements.

The die designer recognizes Producto's Qwik-Fit Guide Pins as an important new feature that die makers want. He specifies them because they save up to 75% of the time normally required for die set assembly and disassembly.

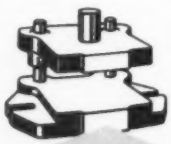
The die designer likes to use Producto's new catalog, the industry's most practical tool. His die layout is simplified when he uses Producto die set templates. And Producto provides him with cost-saving ideas in the DIE SET DIGEST.

Most important, he can depend on *consistent* Producto die set accuracy to transfer from the drawing board to the press the precision and ingenuity of his die design.

Yes, the designer has found that Producto die sets justify his confidence in specifying Producto. You will, too.

TWO FREE AIDS to more economical, efficient use of die sets are available from Producto. All-new CATALOG NO. 11 makes ordering and selection job easy. DIE SET DIGEST gives valuable tips for designers, builders and users of dies. Write for them today.

THE PRODUCTO MACHINE COMPANY
970 Housatonic Ave., Bridgeport 1, Connecticut



Wherever die sets are used

PRODUCTO

PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

CIRCLE INFORM-A-GRAM KEY NO. 134

Fig. 2. The operator uses a vacuum cup stick to pick up a blank for a Chevrolet hub cap from a stack in front of the draw die press. Care is used to see that only one blank is picked up at a time.

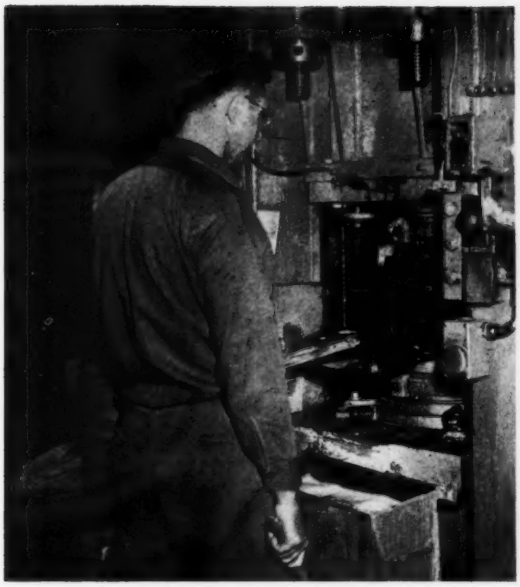


Fig. 3. A hub cap blank is loaded in the draw die for the first of five press operations. Use of the vacuum cup stick keeps hands well away from the die area. Each fourth blank is dunked in draw compound in the small tank before the operator.

trim off a narrow ring of waste.

When the trim die opens, an air ejector blows the stamping and the ring into a short chute at the press operator's right. At the end of this chute, the waste falls into a tote box and the stamping, picked up by the operator's right hand, is turned over and placed on a short elevating belt for transfer to the third press.

At the end of the belt, upper left in Figure 5, the stamping drops into a loading chute for the third press whose die is to precurl the top edge of the stamping. No operator is required at the press in Figure 5 because there are an

Fig. 4. First-draw stampings, received via the chute in the foreground, are loaded into the trim die chute by the operator's left hand. His right hand takes a trimmed piece from the die discharge chute and places it on a belt for transfer to the next press.

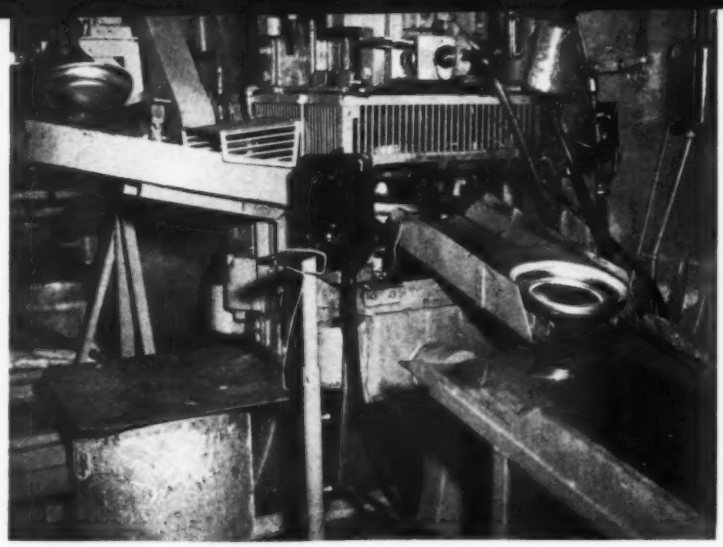


Fig. 5. The press that performs the precurling is fed automatically via the belt and chute, upper left. An electronic eye trips the press when the workpiece, in entering the die, interrupts a beam of light above the die.

electronic "eye" (photoelectric cell) and a light beam projector on opposite sides of the die. When the stamping slides down the chute and into the die, where it centers itself, the light beam is interrupted and an impulse from the cell actuates a relay that closes the trip circuit of the press, causing the die to close and start the curl.

Automatic air ejection of the stamping follows when the die opens and the stamping, in sliding down a short chute, right center in Figure 5, actuates a tilting lever that resets the cell circuit to operate on the next press cycle. From the short chute, the stamping falls into a longer chute that carries the workpiece to the operator at the next press, shown at the left in Figure 6.

This operator places the stamping by hand in a die that, while holding the piece in an inclined position, pierces two small holes and impresses a trademark near the edge of the hub cap. After tripping the press and unloading the piece by hand, the operator places the stamping with its open face up in the loading chute of the automatic press, shown on the right in Figure 6. When the stamping slides down this chute, it centers itself in the die that produces the final curl around the inner of the two major diameters.

Self-positioning of the work in this die interrupts a light beam focused on a photoelectric cell and automatic closing of the die follows, just as for the press in Figure 5. Upon opening of the die, automatic ejection occurs but it is done by a hook operated by an air plunger, the hook pulling the stamping from the die and dropping it into a chute. As the completed stamping slides down the chute, a gate switch is operated to reset the cell circuit for the next press cycle. Stampings leaving the final press chute drop onto a belt that carries them to a department for buffing prior to plating.

It will thus be seen that but three operators are required for the five presses in this hub cap production line. A high rate is made possible in part by the devices described and by the convenient arrangement of chutes and belts.

end

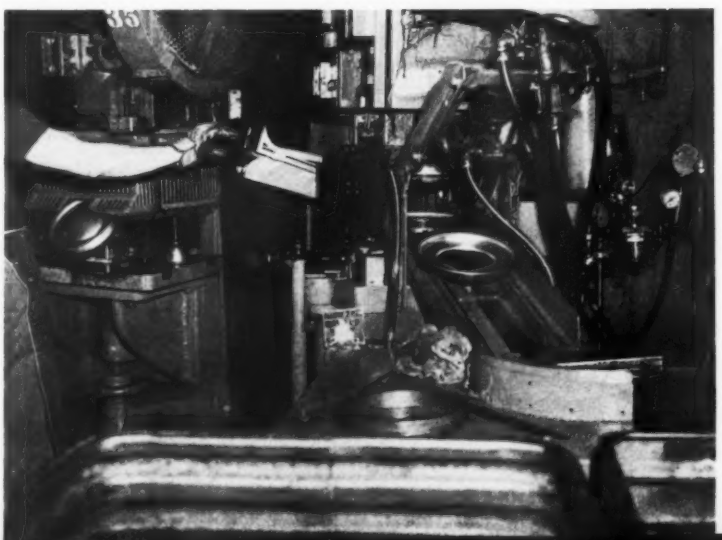
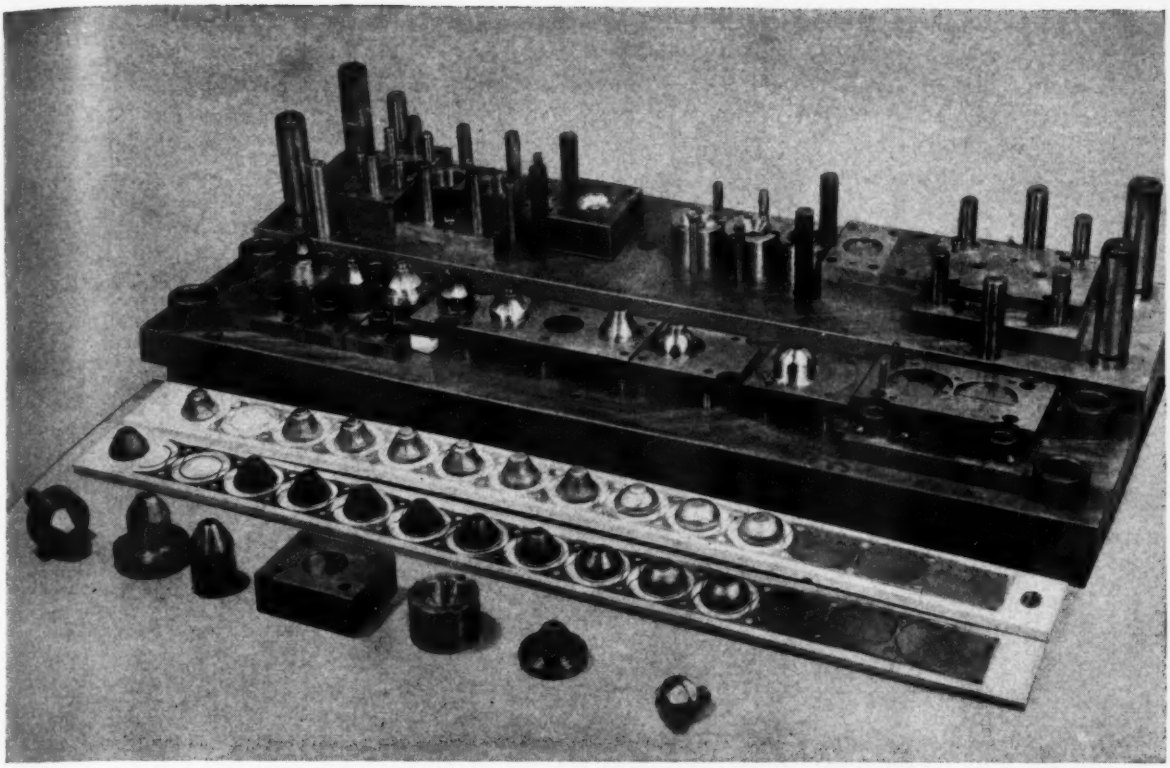


Fig. 6. At left, hand loaded and unloaded press pierces two small holes and impresses a trademark. After transfer to the chute feeding the press at the right, the piece interrupts a light beam thus tripping the press for the operation of completing the curl of the outer edge of the hub cap.



Unique punch and die of the Guarantee Specialty Mfg. Co., Cleveland, Ohio, with change tools and part progress strip in the foreground.

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This particular die, for example, will never become obsolete. Change tools permit its use again and again for any number of shapes. In this case the choice fell upon Uddeholm's UHB-46, a tool steel combining excellent ease of machinability with high non-deformity and safety in hardening. And you can see how essential these qualities were to fill the bill. Why not put the superior performance of Uddeholm's fine Swedish quality tool steels to work for you? No matter how special your application Uddeholm has the right combination of grade, shape, size and finish to meet it exactly.

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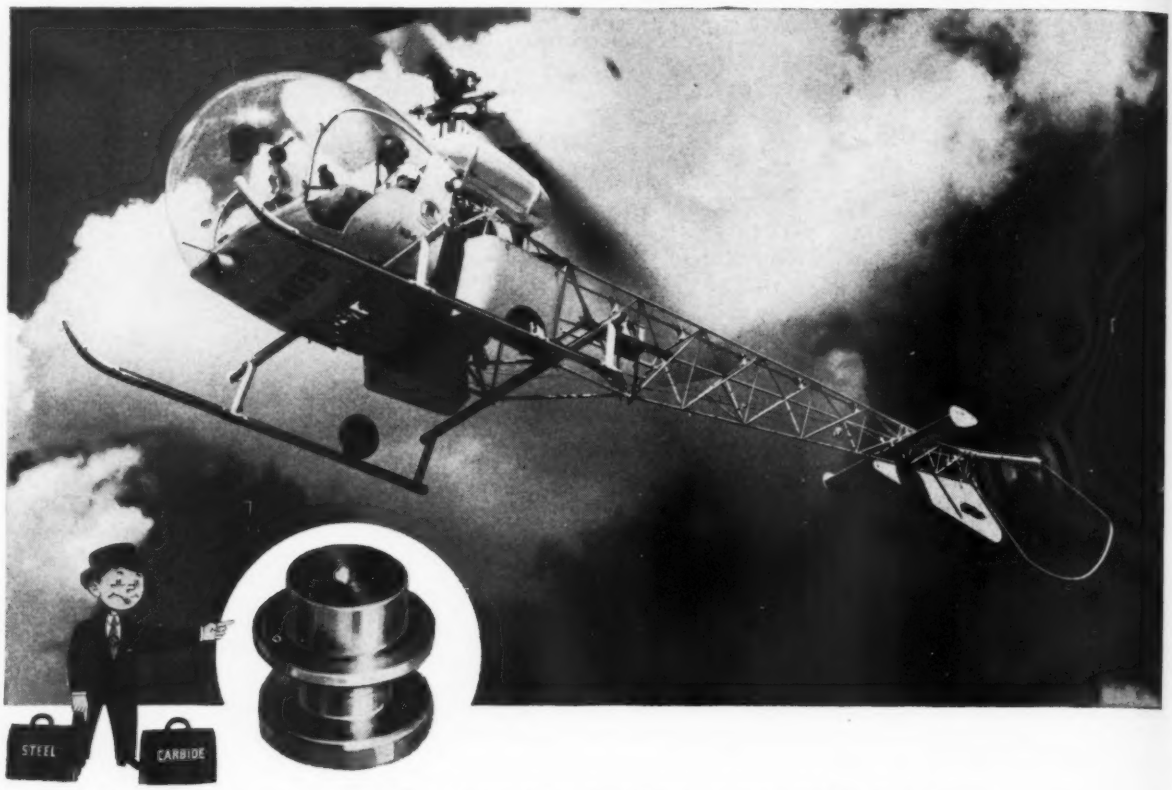

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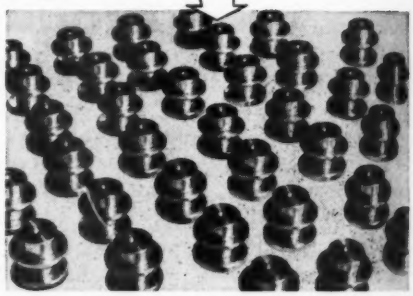
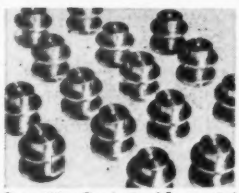


FIRTHITE TXH—35 PER GRIND



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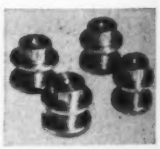

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Diamonite Products Division of United States Ceramic Tile Co., Canton, Ohio, has appointed Eugene Roth, Inc. of White Plains, N. Y., as sales representatives for Diamonite oxide cutting tools in Maine, New Hampshire, Vermont, Massachusetts and Connecticut. Fayjan Tool Sales Co., Williamsport, Pa., will serve as the company's representative in Williamsport and surrounding area.

Fred D. Ullmann of the F. D. Ullmann Co., will represent the Loewy-Hydropress Division of Baldwin-Lima-Hamilton Corp., with offices in San Francisco. BLH manufactures heavy hydraulic machinery and rolling mill equipment.

McBeth Machinery Co. of Cincinnati, Ohio, and Philadelphia, Pa., has been appointed distributor for the line of heavy duty engine lathes produced by Axelson Mfg. Co., Division of U. S. Industries, Inc., of Los Angeles. The Cincinnati office will represent the lathe line in southern Ohio and eastern Kentucky and the one in Philadelphia will cover eastern Pennsylvania, southern New Jersey, Delaware and Maryland.

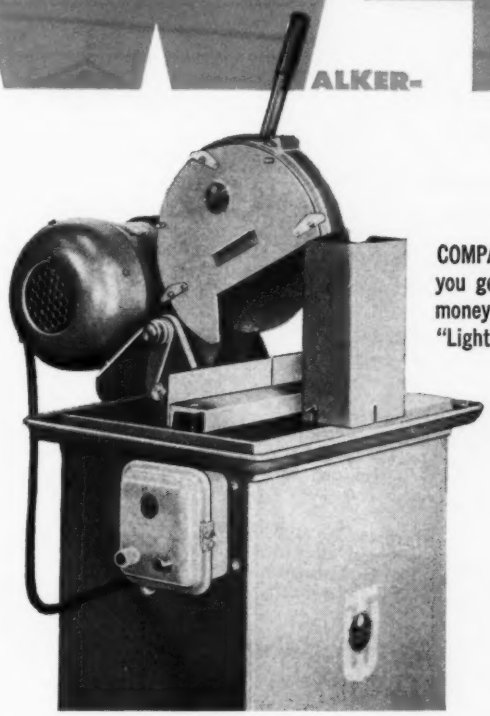
The H. E. Dickerman Mfg. Co. of Springfield, Mass., has announced the appointment of Quad Tool & Die Supply Co., Merchantville, N. J., to serve the area of Philadelphia and eastern Pennsylvania in the distribution of the company's automatic punch press feeds. Complete local stocks of all feeds as well as replacement parts will be carried for prompt service.

Sabre Steel Service, Inc., Buffalo, N. Y., will be the exclusive distributor in the greater Buffalo area for The Vulcan-Crucible Steel Division. Sabre Steel will maintain stocks of Vulcan tool steels, VULground gage and die steels and drill rod.

The Metallurgical Products Co. of Brookline, Mass., has been named sales agent handling The Bassick Company's line of sintered metal parts for all New England and eastern New York.

The U. S. Drill Head Co. of Cincinnati, Ohio, has appointed Walter F. Cahill Co. as its exclusive representative in Michigan. Cahill offices are located in Detroit and Grand Rapids, Mich.

W-T WALKER-TURNER



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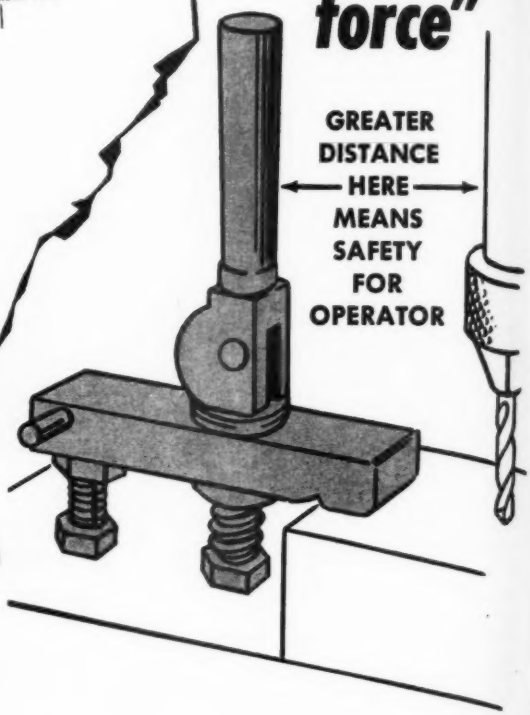

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A5	A23	A41	A59	A77	B13	B31	B49	B67	B85	C3	F8
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A10	A28	A46	A64	A82	B18	B36	B54	B72	B90	C8	
A11	A29	A47	A65	B1	B19	B37	B55	B73	B91	C9	
A12	A30	A48	A66	B2	B20	B38	B56	B74	B92	C10	
A13	A31	A49	A67	B3	B21	B39	B57	B75	B93	C11	
A14	A32	A50	A68	B4	B22	B40	B58	B76	B94	D1	
A15	A33	A51	A69	B5	B23	B41	B59	B77	B95	D2	
A16	A34	A52	A70	B6	B24	B42	B60	B78	B96	F1	
A17	A35	A53	A71	B7	B25	B43	B61	B79	B97	F2	
A18	A36	A54	A72	B8	B26	B44	B62	B80	B98	F3	

Which article in this issue was of most interest to you? _____

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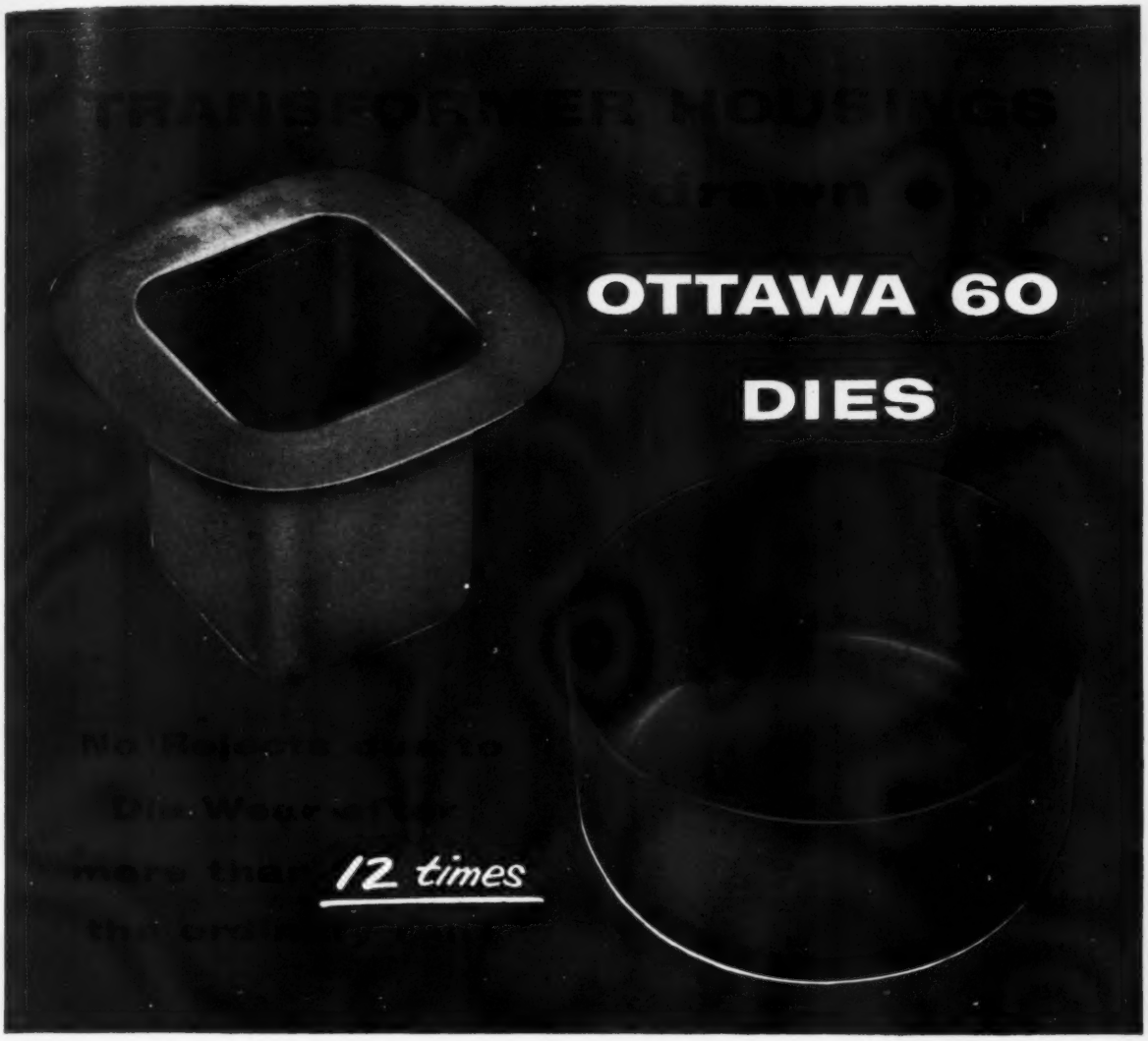


Write for a copy of the
OTTAWA 60 BLUE SHEET
This Blue Sheet contains certified data on the physical characteristics of Ottawa 60, prepared from carefully checked laboratory and field service tests. All the information you'll need on methods of handling and heat treatment, etc.
ADDRESS DEPT. TP-61

OTTAWA 60 is a *new* die steel, an A-L "original," developed primarily to deep draw and form stainless steel. As intended, it performs without galling or pickup and shows exceptional wear resistance in that service. We have plenty of case histories to show you in proof.

But *wherever* you use Ottawa 60 draw dies—not just on stainless steel—this high-carbon, high-vanadium alloy comes through for you. Illustrated above are the first and second draws on transformer housings, produced from .037" gauge SAE 1010 strip. The company formerly used dies made of 5% chrome air-hardening die steel—and later a more highly alloyed material—without ever getting more than about 2000 pieces before the dies began to show gall marks and pickup, and parts were rejected due to scoring, breakage and oversize. *Dies made from Ottawa 60 forgings cured that! Results after 25,000 pieces showed no pickup and no wear on punch or die.*

● You can solve many a problem and save real money with Ottawa 60 draw dies! Write for information or call in our Field Service Staff to help you get started. ***Allegheny Ludlum Steel Corporation, Oliver Bulding, Pittsburgh 22, Pa.***

For complete **MODERN** Tooling, call

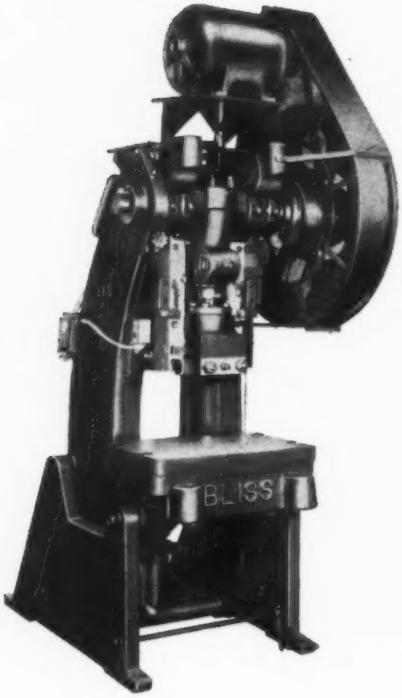
Allegheny Ludlum

WSD 5483

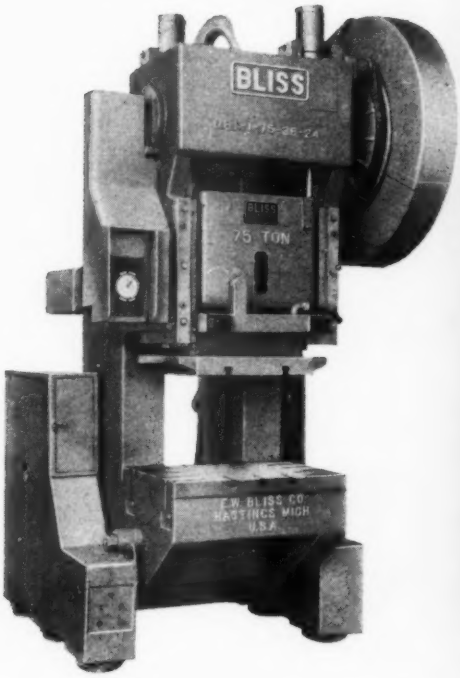
AL® FINE TOOL STEELS SINCE 1854

CIRCLE INFORM-A-GRAM KEY NO. 141

Bliss inclinables offer you a wider cho



Standard Inclinable Presses—as furnished in the 10 to 125 ton range. No. 21-S press, 45 ton capacity, shown here.



Enclosed Inclinable Presses—75 to 200 tons. A 75-ton capacity model is shown here.

More standard types Bliss builds *23* standard inclinables—open-back inclinables, JIC inclinables, hydraulic inclinables, double-crank inclinables . . . offers a wider range of capacities and bed areas than any other make.

More standard clutches The Bliss Positive rolling key clutch and a choice of Bliss crankshaft or driveshaft mounted air friction clutches have been proved on thousands of presses. Bliss has the type of clutch best suited to your work.

More standard feeds Bliss designs and manufactures its *own* line of roll and dial feeds. This single responsibility for both presses and feeds is the press user's assurance that feeds are easily installed and easily adjusted.

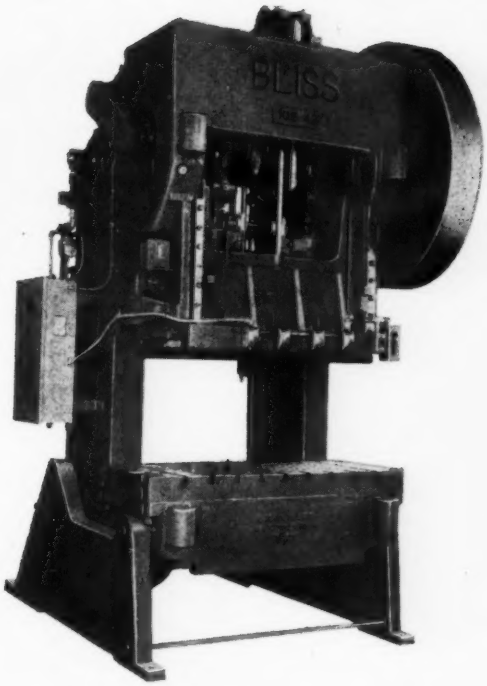
More standard cushions Five different types of cushions, in a range of sizes that meet every need, make any Bliss inclinable a double-action press. Cushions are especially designed for the press and the presses designed to receive them—either assembled to press before shipment or easily installed years later.

. . . And a million dollar parts and service program to protect your investment!

Because Bliss *mass-produces* its inclinables, maintaining a stock-pile of spare parts is a simple matter. The million-dollar inventory of spare parts of Bliss' inclinable plan is by far the largest in the industry and includes clutch plates and parts, shafts, gears, pinions and the like. Moreover, Bliss maintains a separate, specially-trained organization whose sole purpose is to service your spare parts needs as quickly as possible.

ider choice of standard types and sizes

Standard Enclosed Inclinable as furnished in 150 and 200 ton sizes. No. 29, 150-ton capacity, is shown above.



Double-crank Inclinable Presses—from 18 to 175 tons. No. 108, of 100 tons capacity, is shown here.

A few of the reasons why BLISS inclinables outsell all other makes ...and always have

- Cast Meehanite frame—stronger, tougher. Fine grain structure dampens noise and vibration.
- Clutches—whose design has been proved by the thousands now in use.
- Gibs are close fitting, extra long, and insure accurate slide alignment at all points in the stroke. Simple to adjust so that original accuracy can always be maintained.
- Choice of hand, semi-automatic or automatic lubrication.

NEW catalogs now available

32 pages—describes frames, feeds, clutches, cushions and complete line of open back and enclosed single-crank inclinable presses. Gives dimensions and specifications. Catalog No. 2-D.

12 pages—describes these versatile extra-width double-crank presses. Gives dimensions and specifications for entire line. Catalog No. 3.

BLISS
SINCE 1857

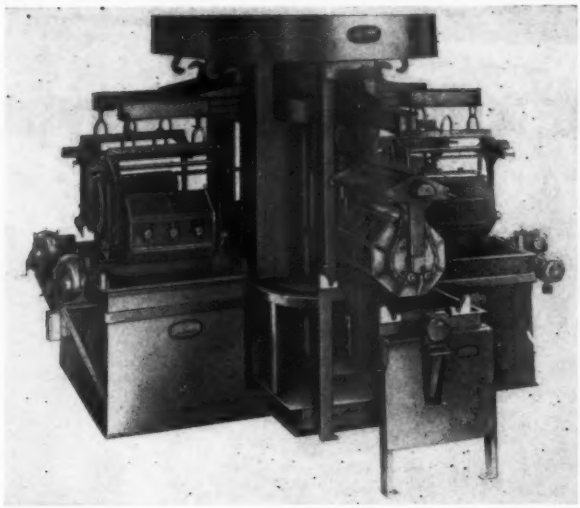
BLISS is more than a name . . . it's a guarantee!

E. W. BLISS COMPANY, Canton, Ohio

Presses, Rolling Mills, Special Machinery

U. S. Plants in Canton, Cleveland, Salem and Toledo, Ohio; Detroit and Hastings, Michigan; San Jose, California; Midland and Pittsburgh, Pa. *Branch offices in* Burbank, Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Pittsburgh, Philadelphia, Rochester, Salem, San Jose, Toledo, Washington, D. C.; and Toronto, Canada; E. W. Bliss (England) Ltd., Derby; E. W. Bliss Co. (Paris), France. *Other representatives throughout the world.*

AUTOMATED BARREL FINISHING



RECENTLY two new Supersheen automated barrel-type finishing machines were announced. These machines are represented by the Skip-Station and the In-Line systems.

Either of these systems can be built into machines for automatic sequence operations, such as descaling, degreasing, grinding, deburring, burnishing, rinsing and rust inhibiting.

The Skip-Station Sub-O-Matic system has a programming feature, which allows parts having dissimilar finishes to be run simultaneously in separate barrels. As its name implies, any pre-selected barrel will dwell (skip) over the tanks which are not required for processing its parts, and dip into those tanks which are necessary to the finish of the parts in the barrel. For example: a barrel of parts may not require descaling or burnishing operations, in which case this barrel would by-pass the descaling and burnishing tanks and would lower into others.

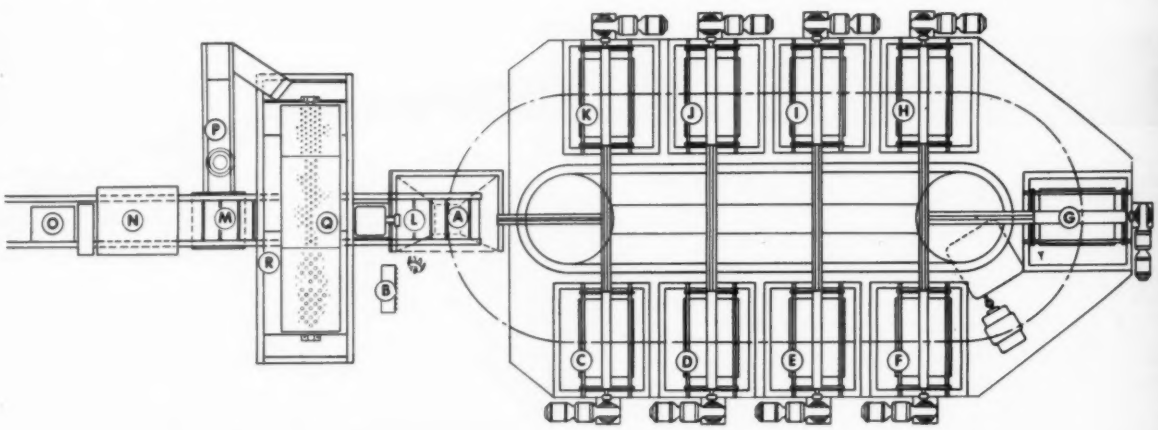
The In-Line Sub-O-Matic system is used for parts requiring the same processing cycle. This system differs from the Skip-O-Matic system only in that the programming feature is omitted.

Delicate parts can be handled without part-on-part impingement as they are engulfed in an abrasive media.

After processing, the parts and the media are deposited on a belt conveyor and a magnetic device separates the processed parts from the media; the media is reclassified as to its size and function, dried and stored overhead. The abrasive media can be handled at the rate of 10,000 lbs/hr. If the parts to be processed are non-ferrous, they are separated from the media by a vibrating screen.

Stampings, die castings, machined parts, extrusions, centerless ground parts, etc., are being automatically micro-precision finished by one operator; the operator controls the system by pre-setting the controls on the control panel.

Manufacturers using Supersheen systems of the Almco Division of the Queen Stove Works, Inc., of Albert Lea, Minnesota, have reported unusual savings in finishing compound materials and labor costs. end



FLOW DIAGRAM OF SUPERSHEEN SUB-O-MATIC SKIP-STATION SYSTEM

10-station Sub-O-Matic system Barrels index every 3½ minutes. **TIME CYCLE:** 40 minutes per barrel. Barrels "dwell" above tank 45 seconds between stations. A barrel of parts is being unloaded every 3½ minutes.

A. Load-Unload station.

B. Control Panel.

C. Clean and Degrease Tank or Station.

D, E, F, G, H, I. — Grinding and Burnishing Tanks.

J. Clear Water Rinse Tank.

K. Rust-Inhibitor Tank.

L. Parts and media are metered to Belt Conveyor at Unload-Load Station.

M. Magnetic Separator separates parts from media.

N. Parts pass along Conveyor through Drier unit.

O. Parts are conveyed to "pick-off" table where one or more operators remove them for assembly or storage.

P. Abrasive media drops into Vertical Bucket Elevator.

Q. Bucket Elevator raises media to overhead Rotary Screen Classifier.

R. Media is separated according to size and drops into Retaining Bins or Hoppers. To recharge barrels, an air-operated control meters the correct amount and sizes of media; parts are then placed in the media mass and barrels are again ready to enter finishing system.

Let an O-M Field Representative Help You Iron Out *Fluid* Power Problems

The best way to solve your cylinder problems is to discuss the problems with your O-M Field Representative in your own plant or office.

Whether you are using air or hydraulic power, your O-M Field Representative can be of valuable assistance to you. His broad experience with cylinder applications and installations qualify him to recommend the air or hydraulic cylinder best suited to your particular application.

Ortman-Miller offers you the full facilities and resourcefulness of its Field Organization and Engineering Staff without cost or obligation.

Call the representative nearest you, or use convenient coupon to the right.

SALES REPRESENTATIVES

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GILMORE SALES CO.
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THE MERCER COMPANY
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PAR INDUSTRIAL SALES LTD.
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P. W. RICE
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THE RODEN COMPANY
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WOMACK MACHINE & SUPPLY CO.
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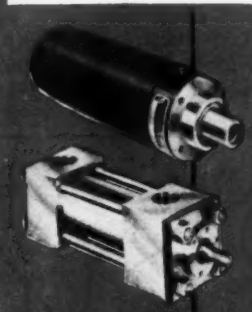


O-M Streamline (Square Line) air and hydraulic cylinders — rated to 300 psi Air, to 1500 psi Hydraulic.

Series TH (Square Line) hydraulic cylinders—rated to 2000 psi.

Both lines of cylinders are available in complete range of sizes (1½" to 8" bores) with standard or oversize rods.

ORTMAN-MILLER MACHINE COMPANY

21 143rd Street, Hammond, Indiana

- ☐ Have Field Representative call
- ☐ Send Bulletin 105 (Square Line)
- ☐ Send Bulletin 101A (Round Line)

Name_____ Position_____

Company_____

Address_____

City_____ Zone_____ State_____

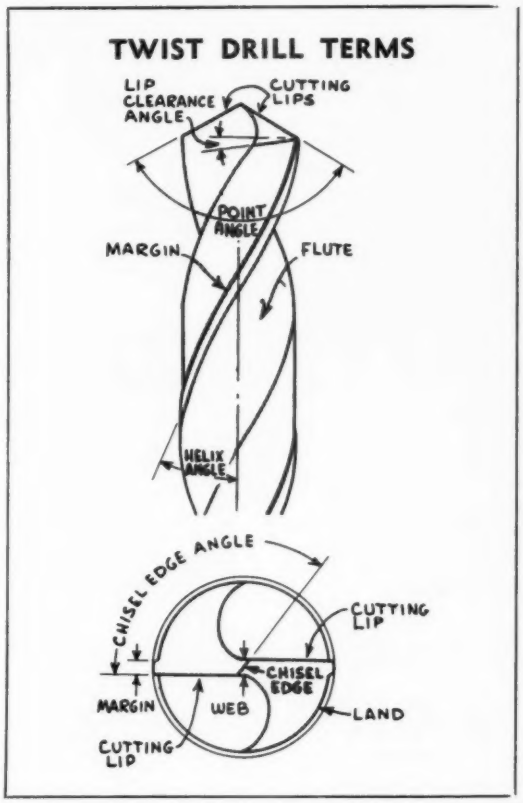
CIRCLE INFORM A-GRAM KEY NO. 145

SPECIAL DRILLS MADE EASILY FROM STANDARDS

ALTHOUGH TWIST DRILLS CAN WITHSTAND an amazing amount of abuse, drill wear and breakage are reduced by using the right one for each job. Special drills that improve the accuracy and speed of drilling can be made by changing the point angle and lip clearance angle of standard drills, report Rockwell-Delta power tool engineers.

The standard 118° point angle is adequate for most work, but faster and better production usually results when the most appropriate of five common variations is used for a given job. And, say the Delta experts, the average person can easily grind drills to match requirements of specific metals and plastics if he knows the fundamentals of a good cutting edge.

Variations in the point angle and lip clearance angle have different effects when working different materials. In general, blunt points are used on harder metals — where there is a danger of tearing — and on very thin sheets. Sharper angles are more efficient when drilling plastics or soft metals. Specifications for various special purpose twist drills are shown in Figures 1 and 2.



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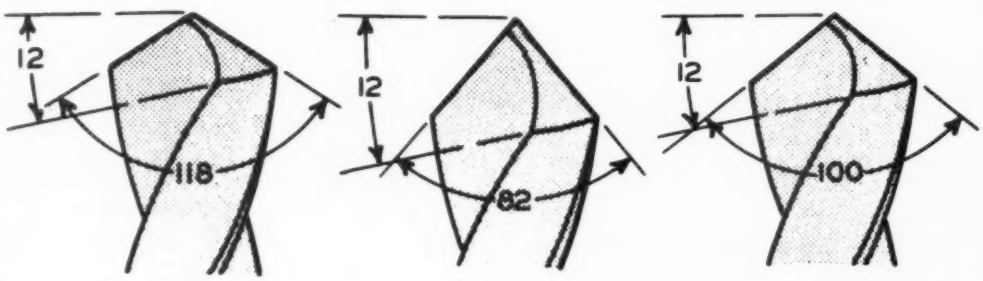


STANDARD

Satisfactory for all materials—specifically for soft to medium Steel.

SHARP

For Wood, Thermoplastics, Hi-silicon Aluminum, 60° angle also used.

MEDIUM

Hi-silicon Aluminum, Hard Copper, Cast Iron, Hard Rubber and Fiber.

WHICH DIE STEEL WOULD YOU USE

to be sure of getting 6,066 perfect holes in this die?

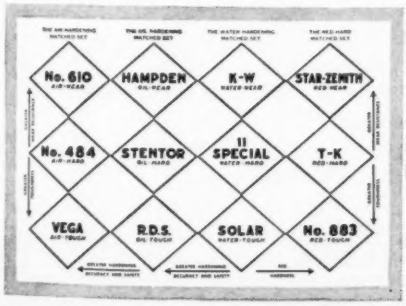
These tools are used in a 60-ton press to pierce 6,066 holes of .036" dia. in aluminum filter pans for a popular home appliance. The job demands "almost everything" from the die steel . . . good machinability and uniformity, minimum size change, extra safety in hardening and toughness to withstand heavy press loads.

The filter pans are 8⅓" in dia., and .025" thick. The 6,066 holes are perforated in three blows, as the die moves through three 120 degree indexing stations. Hundreds of machine hours are involved in drilling and taper reaming the tiny holes.

If the decision were up to you . . . on which die steel would you be willing to stake your reputation in view of this tough set of requirements?

In this Field Report from customer files, here are the amazing results: Working with Carpenter VEGA (Air-Tough) Die Steel, the company reports that not a single "hard spot" was encountered . . . *all 6,066 holes are in the die as planned.* The machining of VEGA was "considerably easier" than the machinery steel used for the stripper plate. What's more, there was no discernible change in size or shape after heat treatment . . . *the die held perfectly!*

You can count on good results from any Carpenter Matched Tool and Die Steel. Take the risk out of your tough tooling jobs. Call your nearest Carpenter Mill-Branch Warehouse, Office or Distributor now for immediate delivery.



Carpenter STEEL

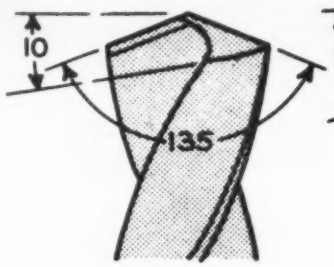
Matched Tool and Die Steels

The Carpenter Steel Company, 106 W. Bern St., Reading, Pa.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

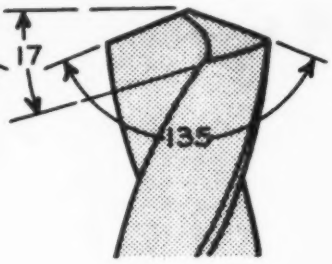
® U. S. Patent Office, The Carpenter Steel Co., Reading, Pa.

CIRCLE INFORM-A-GRAM KEY NO. 147



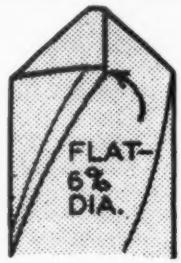
BLUNT

All Very Hard Steels. Lips should be ground to zero rake



BLUNT

All soft to medium Aluminum alloys. Good for drilling in very thin sheets.



ZERO RAKE

Soft to medium Brass, Copper. Most Plastics. Very Hard Steels.

Grinding off the cutting edge of each lip gives a drill with zero rake. This makes the edge scrape rather than cut, and reduces the tendency of the drill to dig into brass and other soft metals and most plastics. It is not good with plastics with low melting points, however, because heat will cause chips to gum and stick to the drill. Zero rake also produces a stronger cutting edge, making it suitable for drilling very hard steel.

Drills, like all cutting tools, require clearance behind cutting edges to permit chip removal. Variation in the clearance angle changes the size and shape of the chip.

Lip clearance angle is ground by starting with cutting lips against the wheel and then dropping the other end through an arc equal to the lip clearance angle end as the drill is rotated through one sixth of full turn. The easiest way to determine how much to lower the drill is to swing a new standard drill against the stationary wheel, noting how much movement is required to keep the ground surface in contact. This will indicate the arc required for a standard 12° clearance angle. Other angles can be obtained by proportionate variation of the movement.

The curved face of the web should be thinned after the point is ground in order to reduce the thrust needed to force the drill through the work. The web can be thinned easily by grinding with a flat-edge or round-edge wheel.

There are also attachments for bench grinders that permit perfect mechanical grinding of drill points of any standard angle. Where points are ground by hand, care should be taken not to burn the drill point.

Most important factor in long drill life, emphasize the Delta engineers, is proper drill press speed. Most well designed drill presses have a sufficient range of speeds for all but extremely specialized drilling.

Speeds recommended by Delta for metals of varying hardness and drills from 1/16″ through 3/4″ are shown in the chart below.

DRILL SPEEDS IN R.P.M.

Diameter of Drill	Soft Metals 300 fpm	Plastics and Hard Rubber 200 fpm	Annealed Cast Iron 140 fpm	Mild Steel 100 fpm	Malleable Iron 90 fpm	Hard Cast Iron 80 fpm	Tool or Hard Steel 60 fpm	Alloy Steel Cast Steel 40 fpm
1/16 (No. 53 to 80)	18320	12217	8554	6111	5500	4889	3667	2445
3/32 (No. 42 to 52)	12212	8142	5702	4071	3666	3258	2442	1649
1/8 (No. 31 to 41)	9360	6112	4278	3056	2750	2445	1833	1222
5/32 (No. 23 to 30)	7328	4888	3420	2444	2198	1954	1465	977
3/16 (No. 13 to 22)	6106	4075	2852	2037	1833	1630	1222	815
7/32 (No. 1 to 12)	5234	3490	2444	1745	1575	1396	1047	698
1/4 (A to E)	4575	3055	2139	1527	1375	1222	917	611
9/32 (G to K)	4071	2712	1900	1356	1222	1084	814	542
5/16 (L, M, N)	3660	2445	1711	1222	1100	978	733	489
11/32 (O to R)	3330	2220	1554	1110	1000	888	666	444
3/8 (S, T, U)	3050	2037	1426	1018	917	815	611	407
13/32 (V to Z)	2818	1878	1316	939	846	752	563	376
7/16	2614	1746	1222	873	786	698	524	349
15/32	2442	1628	1140	814	732	652	488	326
1/2	2287	1528	1070	764	688	611	458	306
9/16	2035	1357	950	678	611	543	407	271
5/8	1830	1222	856	611	550	489	367	244
11/16	1665	1110	777	555	500	444	333	222
3/4	1525	1018	713	509	458	407	306	204

Figures are for High-Speed Drills. The speed of Carbon Drills should be reduced one half. Use drill speed nearest to figure given.

Delta Power Tool Division, Rockwell Manufacturing Co.

"THE BURGMASTER automatic hydraulic turret drill at The Diamond Chain Company plant has proven very satisfactory. The ease of selecting and setting the available wide range of speeds, feeds and stroke length of each turret spindle makes the machine very adaptable for center drilling, countersinking, drilling and tapping set-screw holes in steel sprocket hubs. Tool breakage has been reduced through the use of Burg tool holders, tapping heads and the adjustable hydraulic feeding pressure."

This experience is far from unique. If you are not now experiencing the improved quality of work and production savings possible with the BURGMASTER, *write now for descriptive literature covering all models.*

For complete information, write Dept. TP-10

BURG TOOL
Manufacturing Company, Inc.
15001 S. Figueroa St., Gardena, Calif.

Sales Offices:
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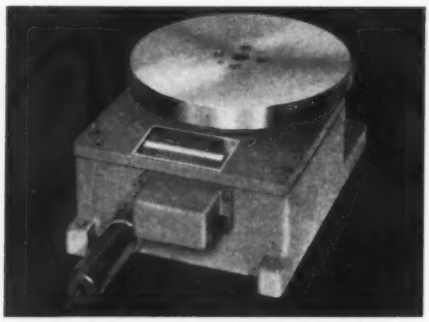
SAN FRANCISCO BAY AREA: Paul A. Kulju 857 Estabrook Street, San Leandro, Calif. LOckhaven 9-2244

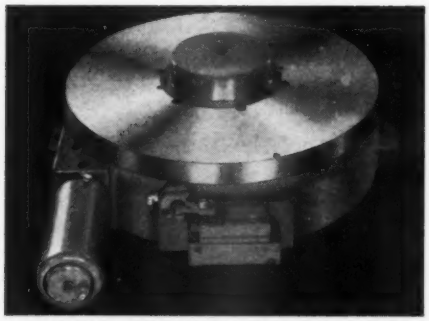
CIRCLE INFORM-A-GRAM KEY NO. 149

QUALITY **PDC** SERVICE

"AUTOMATIC" Pneumatic Assembly Equipment Components

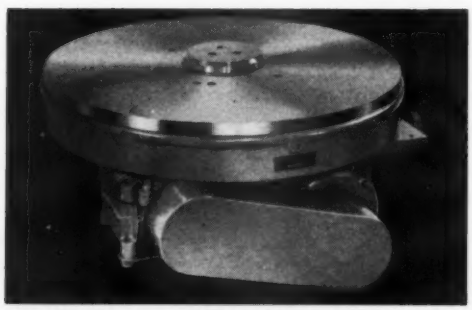


PDC-AM 10 Geneva Motion Index Table (Complete with Controls)



PDC-AM 14 Geneva Motion Index Table (Complete with Controls)

PDC-14 Geneva Motion Index Table



PDC-EMD 26 and **PDC-AM 26** Geneva Motion Index Table

PDC AT 6 Presshead

PDC "AUTOMATIC" Dial Assembly Press (Range to 6 Tons)

PDC AL 1 Presshead

PRECISION DETROIT CO.

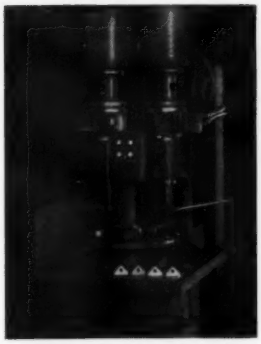
20100 Sherwood Ave. • TWinbrook 2-5331 • Detroit 34, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 150

QUALITY **PDC** SERVICE

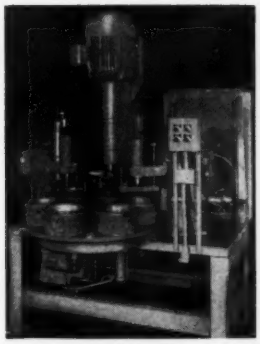
"AUTOMATIC" Special Machines

using PDC "*Automatic*" Assembly Equipment Components



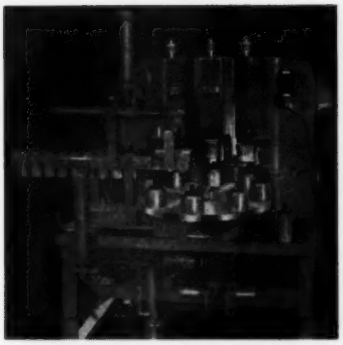
"Automatic" Two Spindle, Lead Screw tapping Machine with PDC-AM 14 Index Table

12016-1



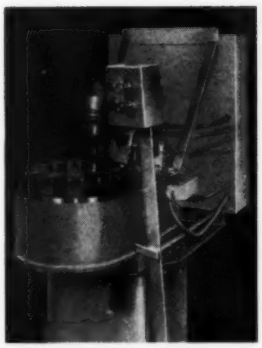
"Automatic" Drilling and Bead Spinning Machine with PDC-EMD 26 Index Table and PDC-AL 225 Spinning Head

12402-2



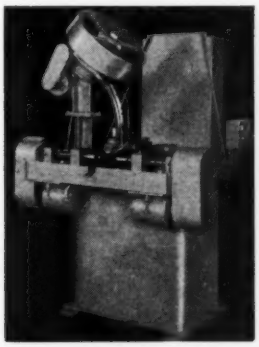
"Automatic" Coil Can Closing Machine with PDC-14 Index Table, three PDC-AT 4 Press Heads and Automatic Ejector

12428-3



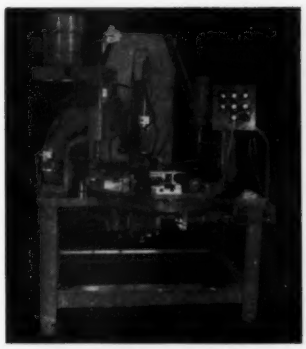
PDC-14 "Automatic" Index Table with High Speed Riveting Hammer

12030-3



"Automatic" Hopper-Fed Double End Chamfering Machine

12030-5



"Automatic" Reaming, Hopper Feeding, and Inserting of Bushing and Burnishing Machine

12069-2

When you have similar production operations to perform, send in your sample parts or prints for immediate quotation on special production machines to suit your specific requirements. . . .When sending for literature or information, please refer to picture number.

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Collected liquids are automatically drained through a float-controlled, pilot-operated mechanism that discharges only when the liquid reaches a designated level, reducing air requirements, and eliminating unnecessary draining action.

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As long as there is pressure on the system the drain operates around the clock, with or without air flow.

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Standard filter is a reinforced 200 mesh Monel wire screen (74 micron). Optional filters are 64 and 25 micron sintered metal.

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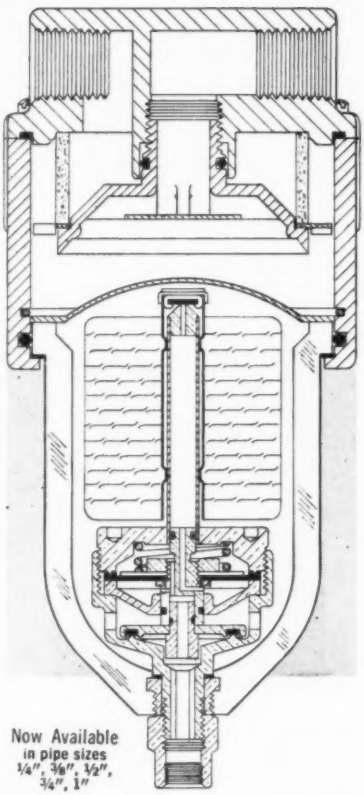
Solids are prevented from entering the drain mechanism to prevent clogging and assure trouble-free operation. A transparent bowl provides a clear view of liquid accumulation and the drain action.



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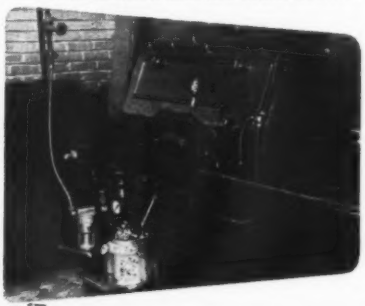

Here, an automotive electrical equipment manufacturer uses Norgren MICRO-FOG to completely lubricate a ⅜" multiple spindle automatic screw machine. On this machine and on many others in the plant, a Norgren Automatic-Drain Filter protects regulator, lubricator, gears and bearings by removing abrasive solids and corrosive liquids from the air line system.

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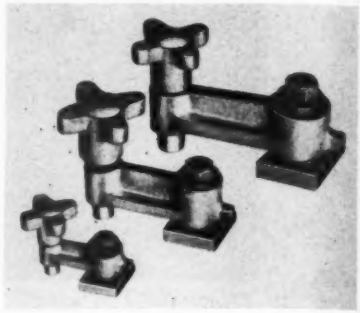
CIRCLE INFORM-A-GRAM KEY NO. 152

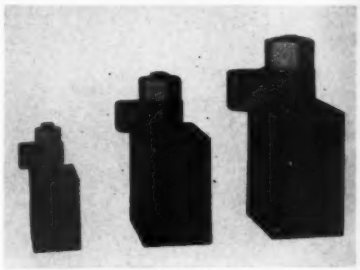
Clamp Blocks Simplify Jig and Fixture Setup

Setting up jig and fixture clamps is now simplified by the use of the recently developed clamping blocks.

Hook and swing clamps have been used for years in the construction of jigs and fixtures, but costly machine work was necessary to build a cast iron base plate or weldment and then machine the plate to receive the clamps.



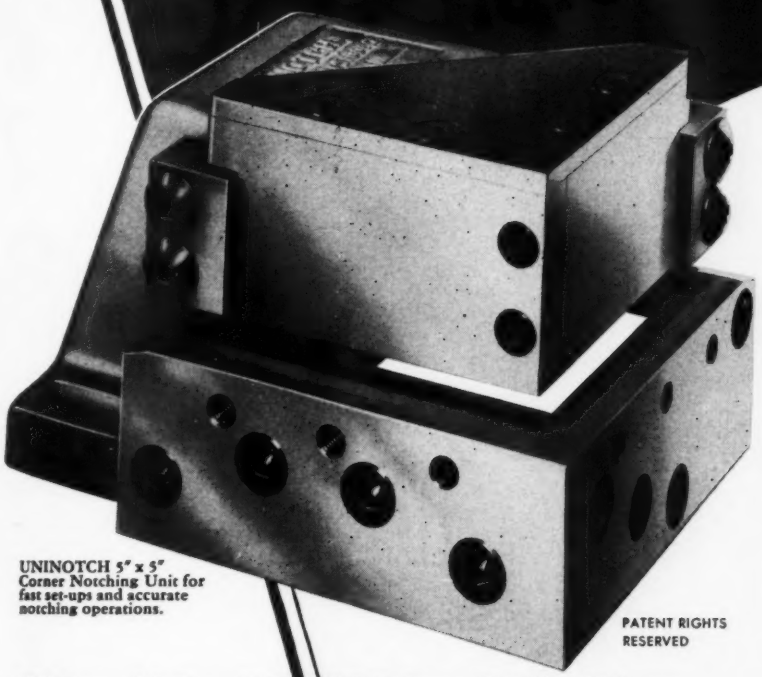
These blocks are designed so that either hook or swing clamps can be mounted on their top surface, and provisions are made for screwing them to a simple base plate. Thus the extra work involved in setting up the clamps, when constructing jigs and fixtures, is eliminated by the use of these blocks.



Details of construction and application are available from the Monroe Engineering Products Company, 1515 Hurd Road, Monroe, Michigan, or—**Circle Inform-A-Gram No. D2.**

The INFORM-A-GRAM CARD on Page 140.1 is for your use in making inquiries concerning Advertisers' Products and Editorial Articles.

Announcing UNIPUNCH



UNINOTCH 5" x 5" Corner Notching Unit for fast set-ups and accurate notching operations.

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NEW complete line of UNINOTCH Corner Notching Units are designed and built for quick, easy interchanging of all punch and die steels. This *exclusive* advantage permits removing and replacing the punch and die steels at your plant without returning the units to factory for service. Both steels are held in absolute alignment by holder. In addition, a complete line of UNINOTCH Vee and Edge Notching Units are available from stock.

Compact design with gib construction permits close notching to inside leg of angles and location of holes close to corner notch in combination hole-punching and notching set-ups.

Series A UNINOTCH Units have the popular 8-3/8" shut height and 3-1/2" die height for material up to 1/4" thick. Series B UNINOTCH Units have the popular shut height of 5-1/2" and 2-19/32" die height for material up to 1/8" thick permitting combination notching and piercing operations with Unipunch Hole-Punching Units in the same press or press brake set-ups on rails, templates or T-slotted plates.

WRITE FOR CATALOG showing the complete line of UNINOTCH Notching Units.

PUNCH PRODUCTS Corporation

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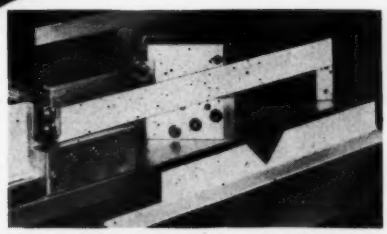
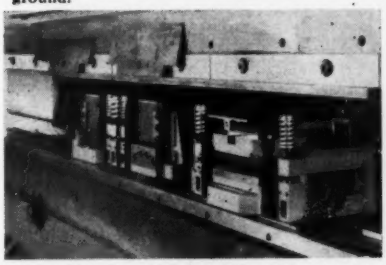
Manufacturers of UNITIZED Hole-Punching and Notching Equipment



Set-up of 2 UNINOTCH Corner Notching Units. Note work piece in foreground with end of angle leg notched and V notch in center showing versatility of UNINOTCH Corner Notching Units.

Showing set-up of combination hole-punching and notching with finished work piece in foreground.



PUNCHING, MARKING, NOTCHING AND FORMING

Showing three operation set-up which is template mounted on a #5100 Unipunch Bed Rail. First operation beginning at right punches 2 holes and numbers part. Second operation punches 3 holes and notches 2 corners. Third operation forms part. Note samples on ram.

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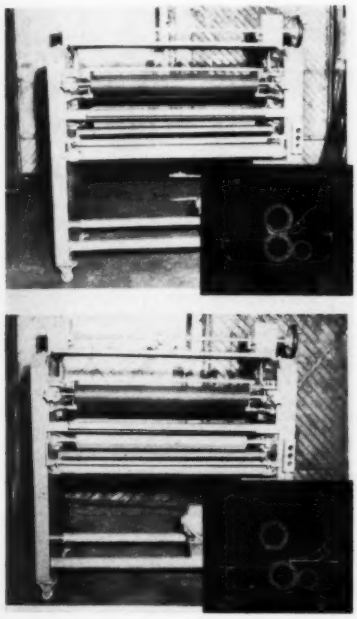
Safety Release on Roller Coater Protects Operator

The problem of hand and arm injuries to roller coater operators throughout industry, considered by many as inherent in this type operation, has at long last been eliminated through the development of a new and highly effective safety feature. It is considered the first major advance in roller coater design in many years.

The new safety feature has been introduced by The Union Tool Corporation, 829 N. Detroit St., Warsaw, Indiana, and is now standard on this company's line of heavy-duty roller coaters.

The new safety feature incorporates a release handle that runs the full width of the roller coater and is



Upper view shows the Union roller coater in normal operating position. Safety release handle runs full-width of the machine and is conveniently located in front of operator's position. Lower view shows machine after safety release handle has been actuated. Inset drawings depict actual operation of the safety feature.

located immediately in front of the operator. In the event the operator should catch his hand in the machine, or should an emergency of any nature arise, the operator depresses the safety release handle. This operates a latch pin which in turn releases the complete lower roll assembly — including rolls, infeed table, pick-off fingers and supply pan. The assembly rotates forward and down, thus creating a space between the upper and lower rolls. The

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Those who buy tools for lasting performance as well as initial appearance always specify "Nelco". These carbide tipped Milling Cutters are precision built for rugged dependability, engineered to "take it"—singly or in gangs —to save *real money*, deliver fast and accurate results without the operational and maintenance "headaches" of most conventional cutters. Look for benefits *and* appearance—call for Nelco—your distributor has the size and type you need in stock.

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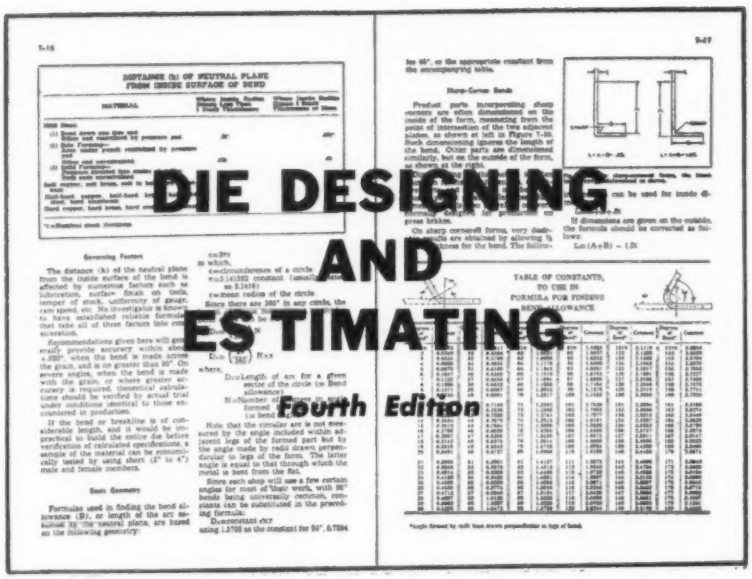

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complete operation is virtually instantaneous.

To reset the lower roll assembly, the operator uses a wrench to turn a cam bar conveniently located on the side of the machine. The cam bar is turned until the assembly contacts a fixed stop, at which point the latch pin, being spring-loaded, automatically engages, locking the assembly in operating position. The fixed stop eliminates any need for readjustment of the lower roll assembly after the latch pin has been engaged.

The new safety feature has been incorporated as standard on all models of Union roller coaters except the Model 5.

Ultra-Thin Strip in Production at Hamilton Division

Applications for ultra-thin precision-gauge metal strip are increasing. The automatic controls, electronics and atomic energy fields are a few users whose special needs are filled with the close tolerance, cold rolled strip being produced by the Allied Products Division of Hamilton Watch Co. of Lancaster, Pa.

Widths up to 4" and in thicknesses from 0.00012" to 0.010" with thickness guaranteed uniform to a tolerance of 0.00005", are now being produced in a wide range of metals.

Rolling extra-thin, precision gauge metal strip on a specially designed Sendzimir mill. Elaborate electronic and hydraulic controls permit continuous adjustment of strip tension and rolling pressure.

Hamilton's facilities and techniques for rolling this strip insure a high degree of uniformity in thickness across the width of the strip. The Division will slit the ultra-thin strip to smaller widths with closer tolerances than are commercially available, on special machines of Hamilton's own design which also insure clean-cut ripple edges free.

The strip is produced in the company's "miniature integrated steel mill." The company will roll the ultra-thin precision strip from metal furnished by customers or will produce (melt, cast, forge and hot roll) the metal for it to the customer's specifications.

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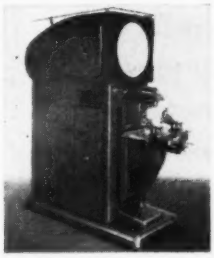

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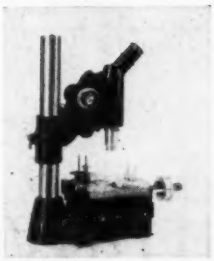

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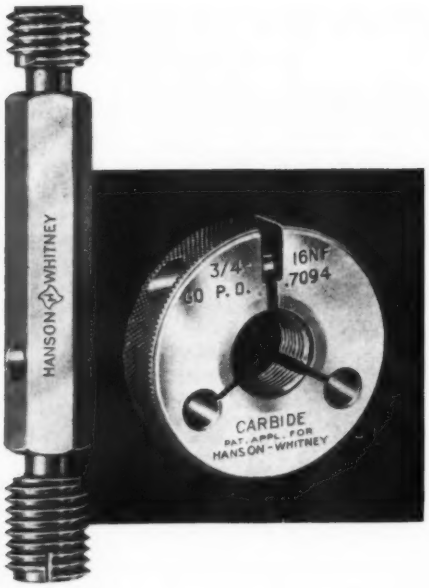

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A Revolutionary Tape Programming Control Device

A revolutionary basic control device, which will open new avenues for vastly simplified automation and other industrial control applications has recently been developed. This device, built by The Teller Company of Butler, Penna., consisting of a new motor incorporated in an automatic control system, permits a multiple series of operations to be programmed on tape or punched cards for the completely automatic operation of milling machines, lathes, grinders, drills, and other machine tools.

The special motor*, developed by the Industrial Controls Corporation of Chattanooga, Tennessee, provides such a high degree of precision and rapid operation that it is fully applicable for instrumentation uses as well.

Teller automatic control device to be used by a midwestern manufacturer for welder positioning control in the manufacture of chassis frames. The step motor controls position of the welding rod so that it follows the contour of the chassis exactly, regardless of variation in construction of the frame. A sensing device rides the chassis, giving exact contour information to the special amplifier (in the cabinet). The amplifier, in turn, directs the step motor which positions the welding rod.

Teller's unique motor together with its special amplifier permits elimination of much complex equipment, thus reducing the number of vacuum tubes, often required, from 400 to 20. It is basically a step motor with patented refinements which permit a most precise measure of high speed control.

A tape or punched card is the control medium, with one mark or other characterization on the tape corresponding to one step motion of the motor, thus providing an electrical gear system. The individual steps can be made so fine and the motor

*See Tooling and Production December 1953, page 50.

operated at such a high speed that the work output of the motor is very smooth. These step motors can be built so that each step represents a very small angular displacement of the rotor. Standard sizes will cover outputs ranging from inch-ounces of torque to thousands of inch-pounds.

Because several motors can be coordinated on a single tape, three or more units can be tandemed for the multiple operations required by machine tools. Thus, on a milling machine, one step motor would cause the table to travel lengthwise, a second cause the saddle to carry the table at right angles, and a third cause the knee to lift or lower the workpiece. It is obvious that other step motors can be added for additional functions, and despite the fact that they might vary in operating speed, the coordinating tape would provide perfect accuracy of the piece being shaped.

Among other characteristics which make this step motor particularly suitable for machine tool operation are its high starting torque, accuracy in indexing, and the fact that, when stopped, the motor is locked magnetically. The motor's ultra-fast acceleration and deceleration provide the required high degree of sensitivity.

So reliable are these units that it is generally not necessary to incorporate feedback, nor need provision be made to eliminate hunting. Regardless of changes in ambient conditions, circuit components, or tape speed, the final coordinated output will remain exactly the same.

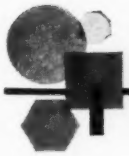
Quality Control Conference

The Cleveland Section, American Society for Quality Control will hold its Third Annual one-day Conference at the Carter Hotel, Cleveland, on October 25, 1956.

Twelve qualified speakers will discuss various phases of Statistical Quality Control, under the general headings of Current Techniques, Theory and Design, and special applications. A special feature will be a Vendor-Vendee Panel Discussion covering the important area of customer-supplier relationships.

Representatives of companies interested in this dynamic technical field are invited.

Reservations may be made through Registration Chairman, Corsey E. Dean, Firestone Tire and Rubber Company, 1200 Firestone Parkway, Akron 17, Ohio. Fee for entire conference, luncheon and banquet is $17.50.



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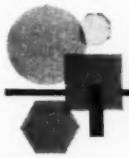

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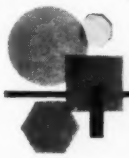

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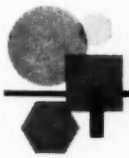

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Or write today to our Cambridge office for your *free* Wheelock, Lovejoy Data Sheets. They contain complete technical information on grades, applications, physical properties, tests, heat treating, etc.

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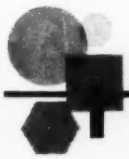
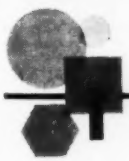


WHEELOCK, LOVEJOY & COMPANY, INC.
144 Milton Street, Buffalo New York



WHEELOCK, LOVEJOY & COMPANY, INC.
4524 W. Mitchell Avenue, Cincinnati Ohio

HOME OFFICE:
WHEELOCK, LOVEJOY & COMPANY, INC.
135 Sidney Street, Cambridge 39 Massachusetts

CIRCLE INFORM-A-GRAM KEY NO. 159

The part at the top is a stamping used in a product for the telephone industry. As you can see it is drawn with heavy score marks on the vertical portions. These marks formerly had to be completely buffed out before finishing. Of course, this was costly work.

Realizing the problem, Laystrom suggested the use of a special alloy steel die which would cost more to make. The results show up in the lower photo, an unretouched picture of the resulting part. Galling and scoring are completely eliminated and the customer only requires a touch up buff before finishing. Added to this, the maintenance on the die takes less than half the time it did before. More pieces before grinding die mean better production, cutting unit costs significantly.

Here is a case of a *better* stamping being a lot less expensive if the overall production picture is analyzed thoroughly. Laystrom is helping many people make vital savings at the same time they are making better products. We'll be glad to work with you, too.

Laystrom

TOOLS • DIES • ASSEMBLIES • PARTS DESIGN • SHORT-RUN DUPLICATING
PRECISION MACHINING OF MEDIUM SIZE STAMPINGS AND CASTINGS

LAYSTROM MANUFACTURING COMPANY
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• Please send us complete brochure covering Laystrom production services to industry.

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Title_____
Company_____
Address_____
City_____ State_____

☐ We are sending drawings for quotation. ☐ Have salesman call. ☐ Send brochure only.

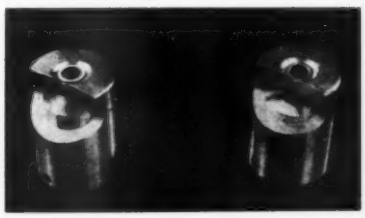
CIRCLE INFORM-A-GRAM KEY NO. 160

Two-Piece Ram for Coin Dimpling Die Shows Big Savings

North American Aviation, Inc. has applied for a patent on a new, two-piece ram for coin dimpling that could save the aircraft industry hundreds of thousands of dollars a year. The new ram lasts three to five times as long as the one-piece ram now in use and is seven times cheaper to replace.

The saving is realized in coin dimpling, a process used in making today's supersonic airplanes whereby a die forms a rounded recess under pressure on sheet metal so that flush rivets and countersunk screws lie flush with the surface and offer no wind resistance in flight. A hole is first punched or drilled, then dimpled. The ram portion of the die supports the dimple around the hole, thus eliminating cracking of the metal. North American alone dimples tens of thousands of holes daily. It uses about 92,000 dies a year.

Dimpling with the present one-piece die has several disadvantages that the new ram has overcome. The old die, (shown at left in illustration), has tapered sides, which lessen accuracy under continuous use. North American's new die has vertical shoulders. The old die also tends to collect metal fragments that eventually cause inaccuracy and cracking. Because it is tapered and in one piece, it has to be made with a precision operation.



North American's new die has a hole drilled through the upper part, so that chips and fragments drop through to the slotted button base, instead of collecting around the sides as in the old die. Simpler in design but every bit as accurate, the new die can be made on an automatic machine tool.

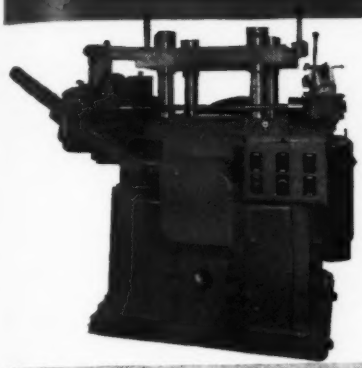
Initial cost of the complete unit is about one-fourth that of the old die. The ram section, which is the only part that needs to be replaced, costs only about one-seventh as much as the old die. Thus, replacement cost has been reduced in North American's new die by about 86%, which, together with its longer life will result in estimated savings of thousands of dollars annually in replacement costs.

Originally conceived by William

here's production you can plan on with

BRANDES

AUTOMATIC PRESSES

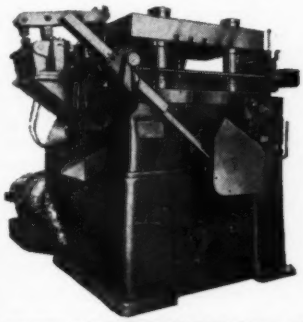


BRANDES 90 TON PRESS

All Brandes Presses are built for ease of operation, with friction clutch and automatic lubrication standard equipment. The vertical bolt lines hold the vertical "V" ways which guide the lower slide. The scrap cutters have heavy square gibbing with exceptionally long ways. The position of the scrap cutter and blades is adjustable.

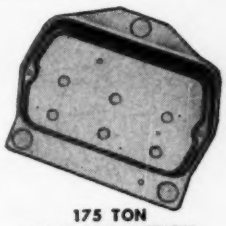
90 TON PRESS PRODUCTION

—Cover 1⅛" deep—.035" C.R.S. at 75 strokes per minute.



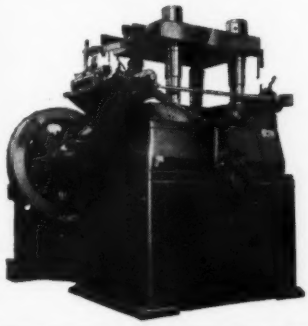
BRANDES 175 TON WIDE BED PRESS

Like all Brandes Presses, the 175 ton features larger die areas—longer die life —patented multiple "V" guides assuring perfect die alignment—low center of gravity—elimination of special pits. Die clearance on the 175 is 28" F to B and 60" R to L.



175 TON PRESS PRODUCTION

—Cover .050" C.R.S.—¾" deep at 75 strokes per minute.



BRANDES 550 TON PRESS

Note the sturdy construction of this press which incorporates all the exclusive performance features of the smaller units described above. The quick feed eccentric is standard on this size machine as is the design arrangement of single back-gear. This press accommodates a die up to 10 ft. in length. Special width and length built on request.

550 TON PRESS PRODUCTION

— Base ⅛" deep — .149" H.R.S.— draw and coin — 30 strokes per minute.

WRITE FOR COMPLETE FOLDER

THE BRANDES PRESS CO.

6408 Euclid Avenue • Cleveland 3, Ohio

NUMBER OF SIZES STOCKED FROM 22 TO 1,000 TON

CIRCLE INFORM-A-GRAM KEY NO. 161

expand metal
shrink metal
roll-form metal

Shown:

A production sequence using GROTNES machines only (except for welding).

Some of Many Products Wholly or Partially Processed on GROTNES Equipment:

Blower Casings • Pails • Milk Cans • Washing Machines • Refrigerator and Freezer Cabinets • Hot Water Tanks • Agricultural and Tractor Tire Rims

GET THIS FACT BOOK
explaining the GROTNES method of cold-forming metals.

GROTNES
MACHINE WORKS, INC.
5454 N. Wolcott Ave., Chicago 40, Ill., U.S.A.
DEPT. H

Stratman, North American tool engineer, in an effort to simplify the manufacture of the ram element and to eliminate certain machining and tolerance problems, the new, two-piece unit has been thoroughly tested and is now in use on all of the firm's dimpling machines.

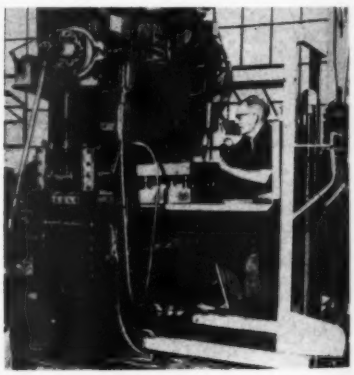
Portable Lift Facilitates Moving Progressive Dies

The press section of the Westinghouse Small Motor Plant in Lima, Ohio, previously handled its dies to and from the die racks and the presses with a massive caster-mounted gentry crane.

The heavy, bulky crane was manually pushed to the die ranks; chains then had to be attached to the dies; the chain hoist raised, and the dies dragged off the shelves until they were suspended from the hoist. Finally the crane was pushed back to the presses, where considerable manual effort was again involved in placing the heavy dies on the press beds.

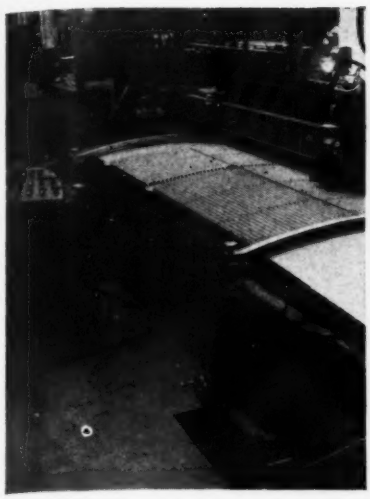
Now, a 1000-lb capacity Oster portable lift handles the progressive dies, some of them 4' in length and weighing up to 1000 lbs, without effort, in less time and with greater safety than before.

The portable lift is rolled to the die racks where the platform is electrically raised to the exact height of the



die, which is then slid onto the work carrier. When the die is wheeled to the press, the lift's platform is again adjusted to the correct height of its bed and the die easily inserted into position.

The lift, which can also be used as a straddle fork truck, portable crane and shop crane, also handles coils of foil steel in the press department.



Automatic Skin Drilling Machine

To replace costly, slow hand methods, Grumman Aircraft Corporation designed and fabricated the "skin drilling machine" shown here.

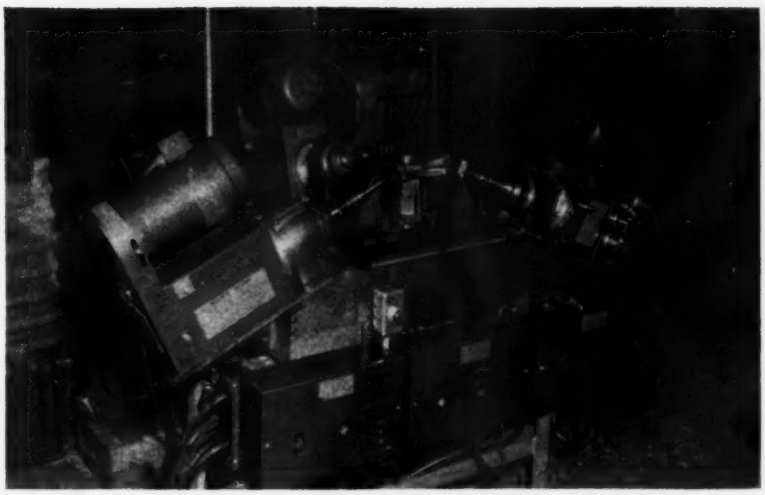
The production requirement was—9000 holes in aircraft skin assemblies consisting of aluminum corrugated section and skin. Formerly, all holes were predrilled by hand in the corrugations and then transfer drilled into the skin. Now, hand work is reduced to tack riveting skin and corrugation and for a few inaccessible areas.

Operation

This new machine clamps the workpiece to prevent burring, drills #40 holes usually ⅝" apart and indexes automatically to next position. A chain and sprocket 1 H.P. drive, regulated by template and photo-electric controls, moves the drill head and lower ram assembly along parallel rails from hole to hole. The workpiece remains stationary. Row on row indexing is done by an air driven gear and rack assembly. 50 to 55 holes per minute, or about four hours per assembly, are now achieved.

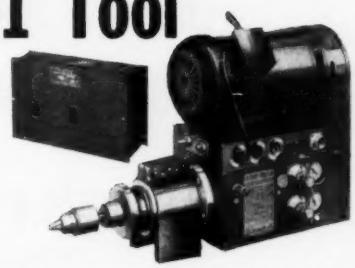
Savings

In addition to the remarkably high time savings of 7½ hours per workpiece, other benefits include reduced jig time and number of jigs, extended drill life and the elimination of operator strain. The drill head used is a Dumore 20-011, self-contained with a rotary vane compressor. This is but one of the many automatic drill units made by Dumore for automation purposes. For complete information, write The Dumore Company, 1304 Seventeenth Street, Racine, Wisconsin.



Drill and Tap Automatically with this 2-in-1 Tool

the New DUMORE Series 28 "DRILL-N-TAP" UNIT



Saves Set-Up, Fixture and Service Costs

One of the world's largest farm implement makers, Massey-Harris-Ferguson, uses three new Dumore "Drill-N-Tap" Units to cut costs and increase production on power take-off housings. These units *automatically drill and tap* three holes in two sizes of housings without changing position on the same set-up. A 1"-thick steel plate is placed under the smaller housings for aligning to proper position. Here, the drilling and tapping are done on the same fixture. Drill bushings are simply removed when tapping. *Tap fits into chuck—no extra tapping head is required!*

The Dumore "Drill-N-Tap" Unit is a *driller* and a *tapper* — all in the same automatic machine. Two tools in one — at the cost of only one!

It drills or taps without attachments — no long overhang, or expensive clutches to wear out. Self-reversing motor, electrically controlled, withdraws tap by reversing spindle rotation. You drill or tap *at the flip of a switch!*

Mounts in 3 minutes — anywhere — on job after job for long or short production runs. It doubles the output of ordinary methods with less tool breakage and scrap losses. Simple nose mounting device provides easy installation on less table area. Work mounts close to fixture with little tool travel for faster cycling, less idling time. 10 speeds from 265 to 4900 rpm.

GET A DEMONSTRATION NOW. . . SEE YOUR DISTRIBUTOR, OR WRITE

YOU CAN DO MORE WITH DUMORE DRILL UNITS

DRILLING • TAPPING • BORING • MILLING • FACING • REAMING • CHAMFERING • DEBURRING

DUMORE PRECISION TOOLS ®

AUTOMATIC DRILL UNITS
TOOL POST AND
HAND GRINDERS

1304 Seventeenth Street, Racine, Wisconsin

CIRCLE INFORM-A-GRAM KEY NO. 163

NEW YORK

"An irregular-shaped hole being ground to within .0002" on the No. 2 Moore Jig Grinder. The machine can do contour grinding of almost any size and shape."—*from facilities booklet of August W. Holmberg & Co., Inc., Flushing, N. Y.*

MISSOURI

"Two No. 2 Moore Jig Borers...permit Ehrhardt to locate and bore holes accurately and to inspect the finished work."—*from facilities booklet of Ehrhardt Tool and Machine Co., St. Louis, Missouri.*

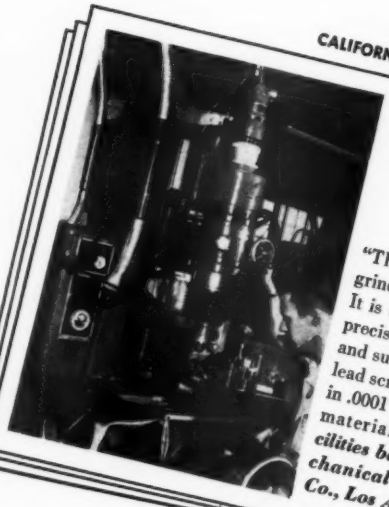
"FACILITIES, FACILITIES, FACILITIES..."

How Leading Tool and Die Shops Across the Nation Feature MOORE Jig Borers and Jig Grinders

Today, top contract tool and die shops often rely on illustrated booklets to sell prospects on their facilities. And they often rely on pictures of their Moore Jig Borers and Jig Grinders to indicate the degree of precision work they can do. It's particularly significant that leading contract shops choose Moore machines for "double duty"—in the toolroom and on the printed page—for these owner-managed firms are understandably deliberate and judicious in selecting machine tools. Write today for detailed bulletins on Moore's top-billed toolroom teammates.

MOORE SPECIAL TOOL COMPANY, INC.
726 Union Avenue, Bridgeport 7, Connecticut

CALIFORNIA



"This precision jig grinder is a Moore No. 2. It is used for producing precision holes, contours and surfaces to accurate lead screw settings within .0001" in heat-treated materials."—*from facilities booklet of Mechanical Specialties Co., Los Angeles, Cal.*

HOLES, CONTOURS AND SURFACES
Moore's *all-new* book tells you how to produce tools, dies and precision parts *the modern way*. 424 pages, 495 illustrations. $5 in U.S.A., $6 elsewhere.

ADD MOORE TOOLS TO YOUR TOOLROOM

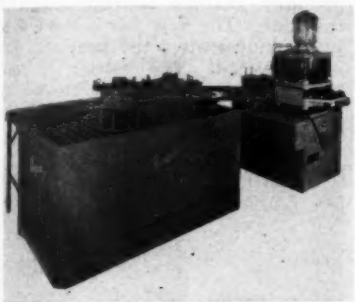
JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

CIRCLE INFORM-A-GRAM KEY NO. 164

Quick Tool Change and Storage of Drilling Heads

The machine illustrated shows how change-overs in limited, intermittent production can be performed when multiple hole drilling is recommended as the low-cost solution in hole drilling. The small four-post unit houses 24" Zagar hydraulic drill heads.

First of all, the basic unit had to be designed so that changing of heads and tooling could be performed easily. The head is changed by dropping the drill head onto a loading basket. Each head is carried on its own loading basket, which is rolled on a conveyor and onto the ball roller table. The only other act required to change the head is to remove and replace the bushing plates and locators.



The roller table serves as storage for the heads while they are set in loading baskets, and not in use, and for the empty loading basket while the head is affixed to the drilling unit. Any number of heads appropriate to the drilling unit can be stored, thus making it possible to drill almost countless hole patterns and any number of holes within a given area.

Zagar drill heads drill holes simultaneously, and varying hole diameters in the same workpiece can be handled by one head.

This multiple spindle drilling machine is built by Zagar Inc., 24000 Lakeland Blvd., Cleveland 23.

Abrasive Machine Tool Co. has announced that its circular graduating machine for machine tool dials and hand wheels is now available. This machine will graduate straight or angled surfaces with from 40 to 1000 graduations with many combinations of length or line.

NTDMA Notes More 'Short Delivery' Tooling Orders

The increase in "short delivery" tooling orders, a current concern of the contract tool and die shops, indicates that "many new-model introductions will be made before the end of the year — especially in the automotive and appliance fields," reported George S. Eaton after the recent National Tool and Die Manufacturers Association board meeting.

The association's executive secretary also noted that in a majority of cities where contract shops are concentrated, most shops are working 50 hrs a week or more.

Orders for special tooling are being received by contract tool and die shops at a very satisfactory rate in most production centers. Steadiest buyers of special tooling, according to President Joseph N. Huser, continue to be the automotive, aircraft, household appliance, electrical, electronics and business machine industries.

NTDMA trustees have appointed Charles R. Bender to the new post of assistant executive secretary of the association. He had been assistant secretary since 1953.

Ses-Matic
PRESS ROOM EQUIPMENT
FOR EFFICIENT HANDLING, STRAIGHTENING, AND FEEDING COILED STOCK TO PUNCH PRESSES!
Ses-Matic Punch Press Gripper Feed
Ses-Matic Combination Cradle and Straightener
Ses-Matic Power Driven Straightener
movable from press to press.
• Quick adjustments—Extremely accurate—low maintenance.
• Increases press room production.
• For stock thicknesses up to ⅛ inch and feed stroke length and stock widths to 18 inches.
• Mounts to bolster plate of press.
• Valve mounted on press, tripped by ram, actuates feed cycle.
• Adjusts automatically for stock thickness. Adjustments for width and stroke length made quickly and easily.
• Accurate — metal to metal stops insure exact duplication of stroke — every time.
Ses-Matic AIR FEED
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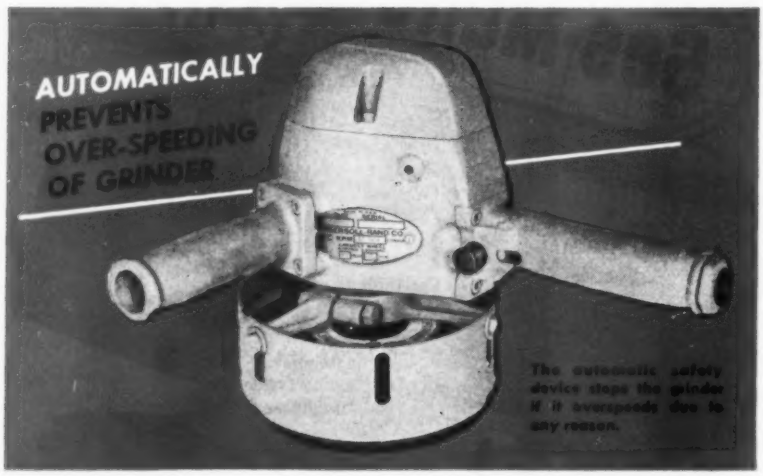
designers • engineers • manufacturers
SPECIAL ENGINEERING SERVICE, INC.
8161 LIVERNOIS AVE. • DETROIT 4, MICH.
• Write Dept. "T" for complete catalog.
CIRCLE INFORM-A-GRAM KEY NO. 165

NEW

THE ONLY

SURFACE GRINDER with a POSITIVE SAFETY SHUT-OFF!



PLUS THESE OTHER COST-SAVING OPERATING ADVANTAGES:

- Handles can be set at 90° or 120° for close corner work and operator comfort . . . another Ingersoll-Rand FIRST!
- A responsive governor insures maximum cutting speed and minimum air consumption regardless of load.
- Single point lubrication, double-sealed wheel bearings, large oil reservoir for long life, low cost operation.
- Top of tool is flat for easy pressure application.
- Available in 2 Models and 4 speeds as follows:

  Speeds: 3100—4100—4500—and 6000 rpm.

  Size 41F with push-locking throttle for constant operation.

  Size 41FX with self-closing, safety type throttle.

Ask for a demonstration of this new safety grinder in your shop.

8-343

Ingersoll-Rand

11 Broadway, New York 4, N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 166

PUSHBUTTON DIE SETTING CUTS DOWNTIME

The unusual Clearing press shown here is a recently engineered machine designed to eliminate major production delays. The press is equipped with a double-size bolster which moves on tracks through the die space area. There is always one bolster outside of the press so that the next set of dies that will be used on the press is set on this bolster while the press is in operation.

Here is the way pushbutton die setting works. When a press run is completed, the touch of a button automatically unclamps the die punch. The slide adjustment is raised to clear, and the outboard bolster with its preset dies is moved under the slide into the press bed area. The slide adjustment is then run down, and the automatic clamps instantly lock the new die punch to the slide. The new job is started in just minutes after the previous job is completed. The bolster is controlled electrically and is moved by power into position where it locks solidly into place.

A unique feature of this Clearing press, which speeds releasing the dies to be removed and locking the new dies to the press slide, is the hydraulic clamp shown in the accompanying photograph. These quick-change clamps make detaching the old dies and clamping in the new dies about as easy and as fast as winding a watch. The clamps are

hydraulically operated and installed on the press slide. The number used depends upon the size of the press.

Pushbutton die setting made possible by this type of press presents important benefits in cutting downtime in plants where large press equipment is used for comparatively short runs. One of the classic examples of this kind of production problem is found in the aircraft industry where die setting time often exceeds the time spent for productive operation. Delays for die setting, of course, are a problem and a cost, for any press shop and time records kept for personnel and machines can easily demonstrate the need for this new downtime saving feature.

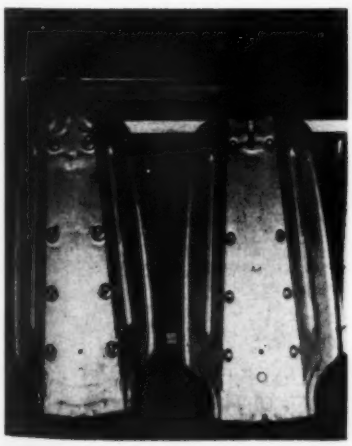
Pushbutton die setting is available on various types of presses — single and double action, top drive and bottom drive. It also may be provided on Transflex presses to keep press utilization time to a maximum through frequent die changes.

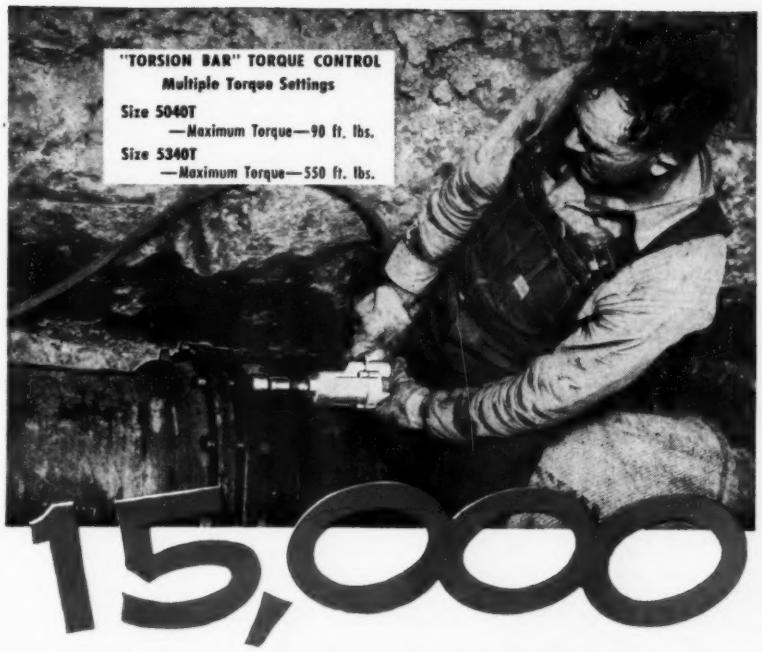
Plastic Tooling Solves Emergency Prototype Problem

Plastic tooling aided Great Lakes Spring Division of Rockwell Spring and Axle Company in making samples for a customer. Great Lakes had contracted to supply about 100 prototype seat backs to an auto maker for their pre-production samples before regular production began. Samples were needed before completion of regular tooling.

In order to insure that the customer received his samples on time, Great Lakes built interim tools from Rezolin Toolplastik compounds, based on Bakelite epoxy resins. Assisting in the project was Federal Machinery Sales Company, Chicago representative of Rezolin, Inc.

The tools, built in a few days at a cost of about $500 in labor and ma-





15,000

3/4" bolts uniformly tightened to 60 ft. lbs.

TORSION BAR

with new Ingersoll-Rand

Torque Control IMPACTOOL

PROBLEM:	Assembly of 1390 mechanical pipe joints involved over 15,000 3/4" bolts. The problem was to speed assembly, remove guesswork and assure proper tightness of all joints.
AIR ENGINEERING SOLUTION:	A new Ingersoll-Rand Size 5040T Torsion Bar Torque Control Impactool, preset to deliver 60 ft. lbs., was put on the job.
RESULT:	The Torque Control Impactool automatically shut off at the preset Torque . all guesswork was eliminated . . . uniform joint tightness was produced . . . an average of 10 minutes per joint was saved . . . smaller bell holes were required due to compact size of the 5040T this one tool produced an extra profit of $404.25 on this job.

You can put these new "Torsion Bar" Torque Control Impactools on your nut running jobs and reap these benefits: Positive Torque Control . . . Simple Torque Setting . . . Setting remains constant . . . No pressure regulators needed . . . No operator training.

Write or phone for a free demonstration of this revolutionary fastening development.

Ingersoll-Rand

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CIRCLE INFORM-A-GRAM KEY NO. 167

Announcing . . .

METLFAX

METLFAX: a new, unique publication!

METLFAX: devoted exclusively to serving the metalworking industry!

METLFAX: first issue — November 1956!

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METLFAX: written to command the interest of design, engineering, tooling, production and management executives at all levels and in every phase of metalworking!

METLFAX: aims and objectives — to aid the entire metalworking industry in achieving maximum production at minimum costs!

METLFAX: capsule comments on all metalworking subjects, providing a previously non-existent coverage of the entire metalworking market!

METLFAX: over 75,000 copies! An initial controlled-circulation to more than 75,000 metalworking executives, by name and title, in every size and type of metal-working plant throughout the nation! Circulation list over four years in the making — 100% up-to-date!

METLFAX: offers the lowest per thousand full-page rate for reaching the entire metal-working field! Maximum metalworking coverage at an unbelievable low cost of less than $4.00 per page per thousand copies!

Closing date for the December issue is November 1, 1956. For full information, rates and details, address . . .

METLFAX

1975 Lee Road

Cleveland 18, Ohio

terials, turned out the samples with time to spare. The method used by Great Lakes demonstrates how easily such tools can overcome seemingly insuperable production bottlenecks.

Work starts with a wooden pattern furnished by the customer. It is placed in a box and the entire exposed surface is coated with a release agent. Several layers of glass fabric bonded with Rezolin L-900 laminating resin are placed over the wooden model. Bakelite epoxy resins are used in the Rezolin compounds because of their bonding characteristics and the fact that they cure without heat or pressure. After laminating, the remaining area in the box is filled with a mixture of the laminating resin and buckshot.

The finished die is a very strong dimensionally stable reproduction of the pattern. After the die is made, another compound, Rezolin L-940 flexible epoxy, is cast in a plaster mold taken from the original wooden pattern. The L-940 punch may also be cast directly against the finished plastic female die after waxing the surface to prevent adherence. After removal from the mold, this cast becomes the resilient punch for use with the die previously made. This punch is strong enough to form the metal without fracturing it. The Great Lakes tool was used to make approximately 100 metal stampings, as shown, the number needed immediately.

Baler Solves Stamping Plant Scrap Problem

Economical handling of the daily scrap accumulation is extremely important in maintaining plant operating efficiency.

New Delphos Manufacturing Co. of Delphos, Ohio, averages 35 tons of flat sheet scrap per month. The majority of it is 26 and 28 gauge galvanized metal in the form of slim trimmings or corners from circular blanks. Unless immediately removed from operational areas it could materially affect manufacturing efficiency from the standpoint of space alone. Storage in large bales or loose quantities was an even more critical problem.

To handle the scrap the company has installed a new "Scrapomatic" baler, made by the East Chicago Machine Tool Company. Hydraulically operated, it occupies only 12' x 3½' of floor space and produces a one foot square briquette, weighing between 75 and 100 lbs, every 3 min. As a result, labor requirements were reduced to one man.

The Scrapomatic weighs only 4000 lbs, so no pit or anchoring is required.

BURKHARDT

HYOP 54

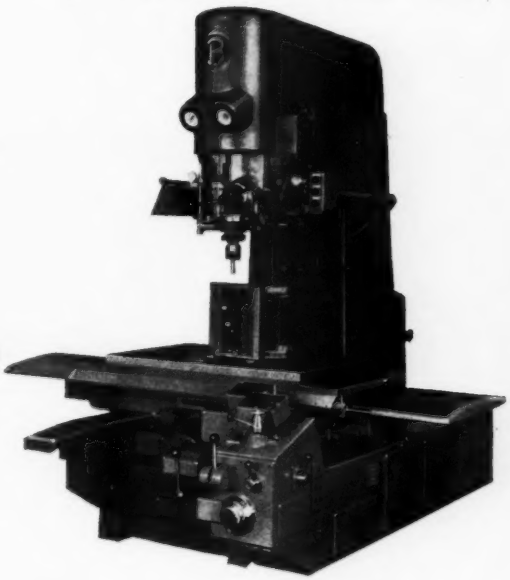
CO-ORDINATE JIG-BORING AND JIG-GRINDING MACHINE

Hydraulically Operated

with LEITZ OPTICS and large projection screens

Accuracy of Adjustment Fifty Millionths of an Inch

- Highest precision-boring
- Finish-milling
- Grinding
- Honing



- **Hydraulical movement of the table and the boring-slide.** Infinitely variable hydraulical feeds. Automatic reciprocal stroke of the boring-slide for grinding and honing.
- **Infinitely variable spindle-speeds by drive system Ward-Leonard.** Tool-feed by hydraulical movement of the boring-slide.
- **Projection-optic system Leitz.** Pre-selection of positions up to .00005" accuracy.
- **Drive of the grinding-spindle by medium-frequency-motor (manufacture Bosch).**

PARTIAL SPECIFICATIONS

Clamping surface of table	48" x 31"
Maximum distance between table and spindle	38"
Maximum quill travel (hydraulic)	10"
Grinding diameter (internal)	3/8" to 6 3/8"
Spindle speeds, infinitely variable	from 5 to 1,500 r.p.m.
Table movement, longitudinal	45"
Table movement, transverse	27"
Power consumption of motor	8 H.P.

COLUMBIA INTERNATIONAL CORP.

Importers of Fine Machine Tools

10-35 44th Drive, Long Island City 1, N. Y.
Telephone: STillwell 4-1546

DEALERS INQUIRIES SOLICITED

CIRCLE INFORM-A-GRAM KEY NO. 169

To Economize . . . Standardize

by R. J. Pearson
RING PUNCH & DIE, INC.
Jamestown, New York

DURING THE PAST five to ten years there have been great strides made by various industries in standardization of various products.

As an illustration, many ordinary items such as die sets, screws, dowel pins, springs, etc., were made by individual machine and tool shops in small quantities as they were required. These products or parts were not only costly but were quite often inferior in quality from a standpoint of heat treating, accuracy, strength, sizes, etc.

At the present time this practice of making such products in individual shops is almost unheard of because all such items are now being produced by manufacturers who specialize in making these certain products. These manufacturers maintain very rigid standards so that these products are very exact and uniform in every respect. Also, they are usually interchangeable. In addition, they can be purchased from large stocks in varying sizes at only a small fraction of the price that they formerly cost for an individual to make in his own shop.

Today there are quite a number of reliable punch and die manufacturers who make and ship their products to all parts of our great country as well as export.

These products are also made under very strict and rigid tolerances pertaining to the quality of tool steels, uniformity of Rockwell hardness, concentricity, sizes, etc. Most of this information is available in the punch manufacturers' catalogs under engineering data.

Most of these manufacturers stock their products in large quantities both in finished and semi-finished stages in order to fill orders promptly. Because these products are mass produced with precision grinding equipment, they can be purchased very economically. Even special and unusual shaped punches and dies are made more economically by these specialists because they have more concentrated experience and more suitable equipment. Many manufacturers of precision punches and die bushings stock their standard sizes in principal cities in order to expedite deliveries.

During the past number of years many users of punches and die bushings have standardized on some make of these products. The results have not only reduced the initial cost but also have effected real economy because these precision punches and dies will produce many more holes between grinds along with more holes per punch. In addition, this eliminates costly downtime and labor costs which are a tremendous factor in producing a finished product.

The purpose of this article is to urge and encourage men responsible to consider these facts carefully in their future production planning.

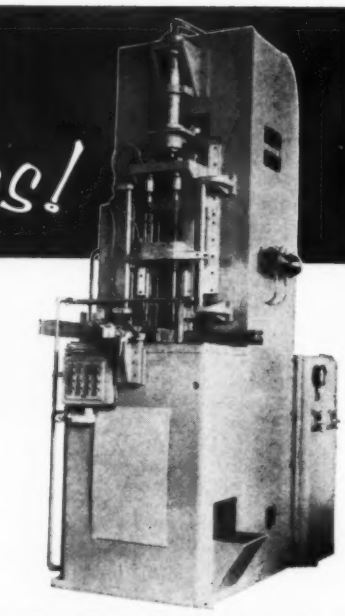
Please remember, like the "nuts and bolts," you can now purchase quality punches and dies at tremendous savings as compared with making them in your own tool and die shop.

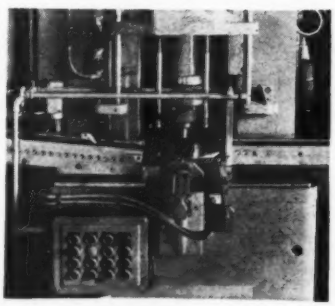
ACME
Automates!

for '57 model production

Acme Broach Corporation has recently developed and manufactured automated broaching equipment for use by some of the leading U. S. automobile builders for uninterrupted, continuous, high production of component parts . . . The parts to be broached are supplied to this equipment from customer's conveyor line and are automatically broached two at a time and ejected to a continuing conveyor.

Illustration at right shows close-up of broaching station and automatic part handling equipment. In production use, machine continues to cycle automatically, feeding, broaching and ejecting the completed parts . . . A selector switch allows for manual cycling for set-up and checking purposes. This unit produces approximately 250 completed pieces per hour at 100% efficiency.





Write or Wire for Further Information

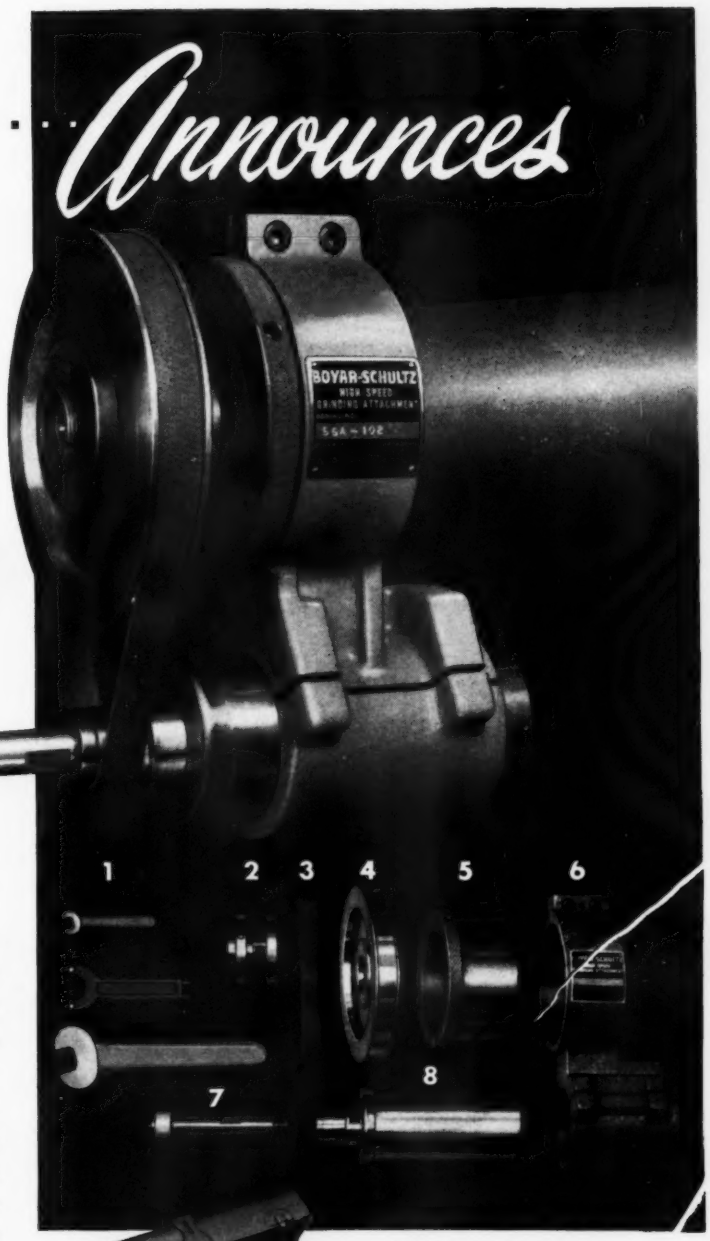
ACME BROACH CORP.
MILAN, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 170

EVERY WEEK IS
BUY U. S. SAVINGS
BONDS WEEK!

Boyar-Schultz . . . . Announces

a New HIGH SPEED GRINDING ATTACHMENT for Surface Grinders



Designed for grinding angles or slots too small to permit the use of a standard size grinding wheel; for grinding serrations, T-slots and many other hard-to-get-at surfaces.

It provides higher spindle speed, and is also used for grinding small radii and small contours in die blocks or other parts requiring this type of grinding.

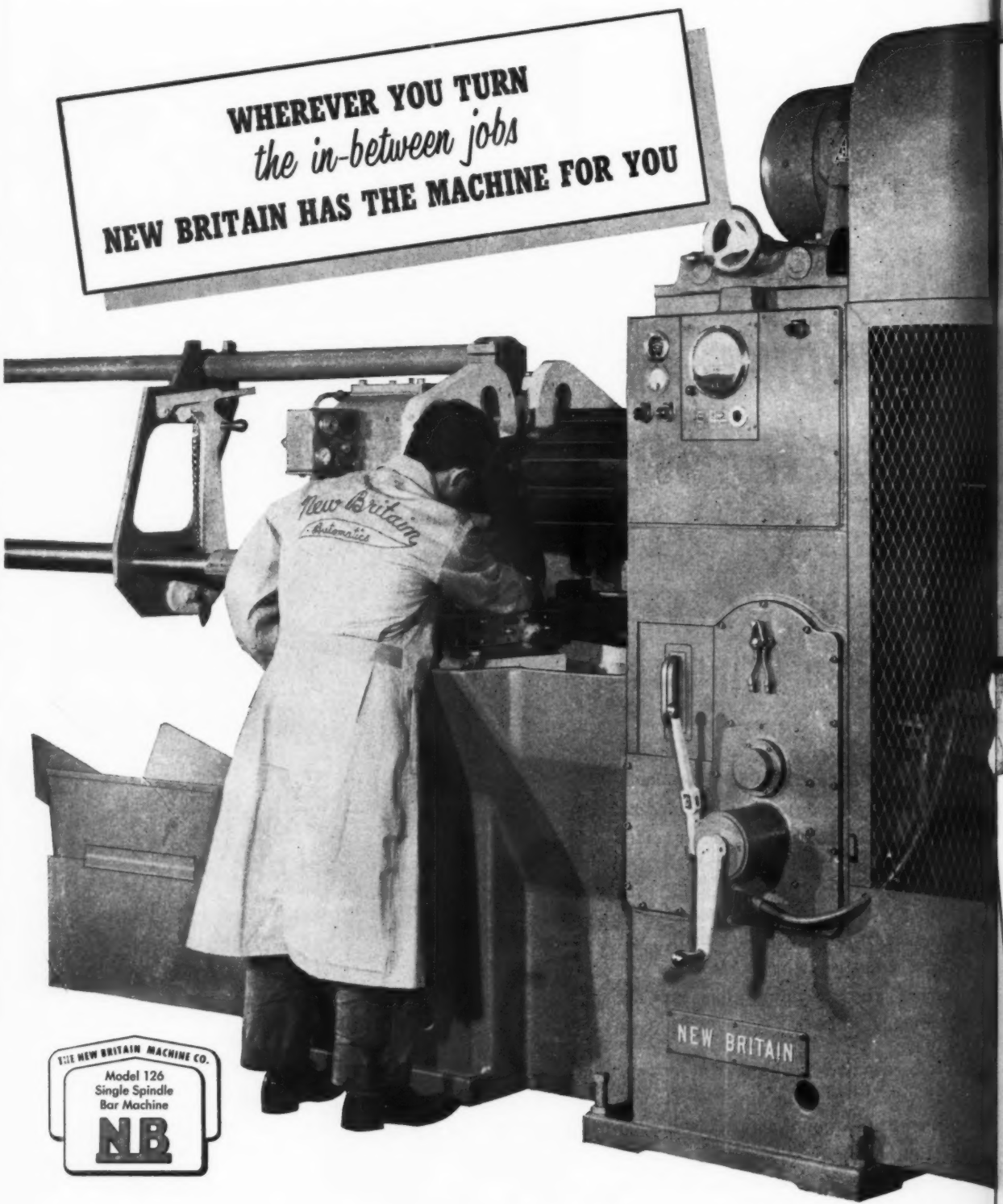
It is mounted on the surface grinder spindle housing in a matter of minutes. Belt tension is adjustable through an eccentric bushing. The spindle is equipped with permanently lubricated, preloaded super precision ball bearings.

1. Set of Wrenches
2. Adapter Assembly
3. Belt
4. Pulley
5. Eccentric Bushing
6. Adapter Bracket
7. Quill
8. Spindle—preloaded permanently greased
9. Steel Container

BOYAR-SCHULTZ CORPORATION

2012 SOUTH 25TH AVENUE
DEPT. QHSG
BROADVIEW. ILLINOIS

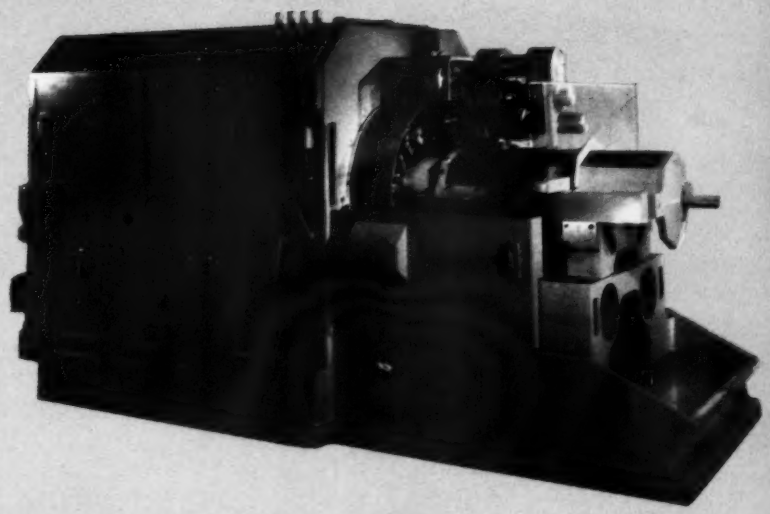
CIRCLE INFORM-A-GRAM KEY NO. 171



In the big borderline area of production between hand screw machines and multiple spindle types, the Model 126 New Britain single spindle bar machine can make money for you. It's rugged, fast and highly accurate. It requires minimum set-up time for tool changes, cross slide cam settings and positioning of operational sequences on the central program drum. Capacity 2⅝". May we mail you more details?

WHEREVER YOU TURN
castings, forgings or pressed metal pieces
NEW BRITAIN HAS THE MACHINE FOR YOU

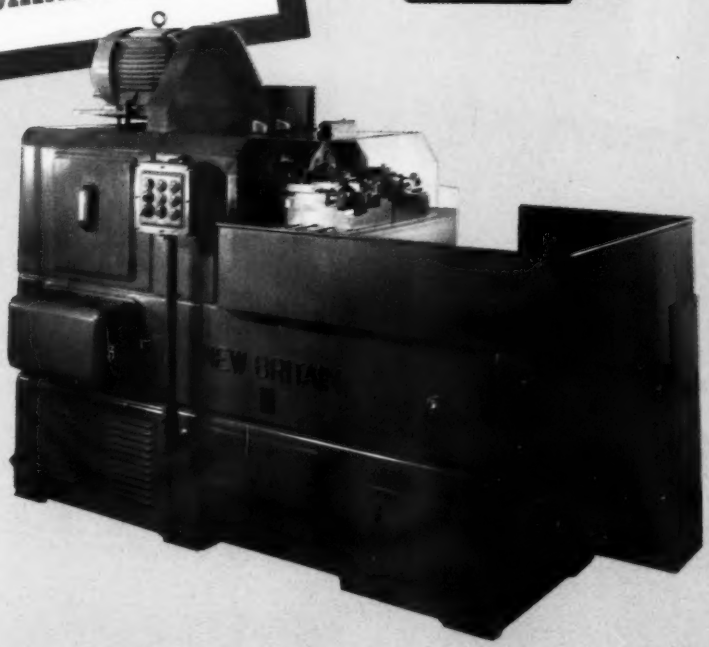
THE NEW BRITAIN MACHINE CO.
Model 810
Automatic
Chucking Machine
NB



Versatility, accessibility, quick setup and sustained high production of precision parts are what you look for in an automatic chucker. New Britains are famous for these features all over the world. Perhaps you are also thinking of the possible savings which automatic loading, unloading and automatic gauging could effect. If so, you will want to learn about the imaginative use of automated production which New Britain engineers are applying to chucker work these days. You can now handle bigger pieces than ever on New Britains too —up to fifteen inches in diameter.

WHEREVER YOU TURN
or bore precision contour work
NEW BRITAIN HAS THE MACHINE FOR YOU

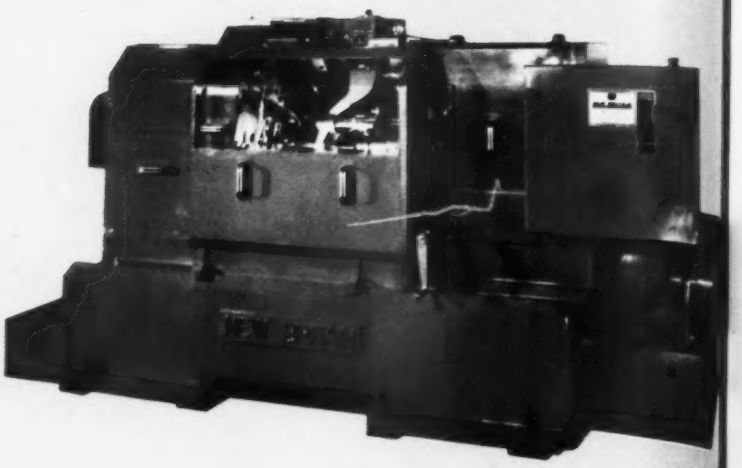
THE NEW BRITAIN MACHINE CO.
Model 37
Precision Boring
Machine
NB



New Britain precision straight and contour boring machines provide a new approach to machining parts that would be problem pieces on any other type of equipment. These simple, fast, accurate machines require minimum attention and utilize inexpensive single point tools. They make the most profitable use of automatic loading, gauging and tool adjustment where these features fit the job requirements. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

WHEREVER YOU TURN
on multi-spindle bar machines
NEW BRITAIN HAS THE MACHINE FOR YOU

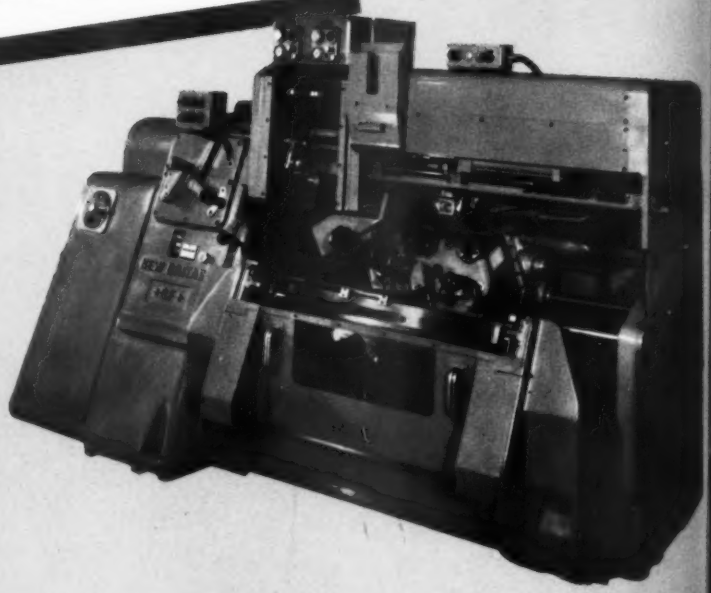
THE NEW BRITAIN MACHINE CO.
Model 62
Automatic Bar
Machine
NB



The new Model 62 New Britain bar machine has an independent radial cross slide in every position — opening new possibilities for effective tooling. New Britain "accuracy features" include spindle carrier lifting to eliminate wear during index, plus rigid locking of the carrier during the cutting cycle. Magazine loading available if desired.

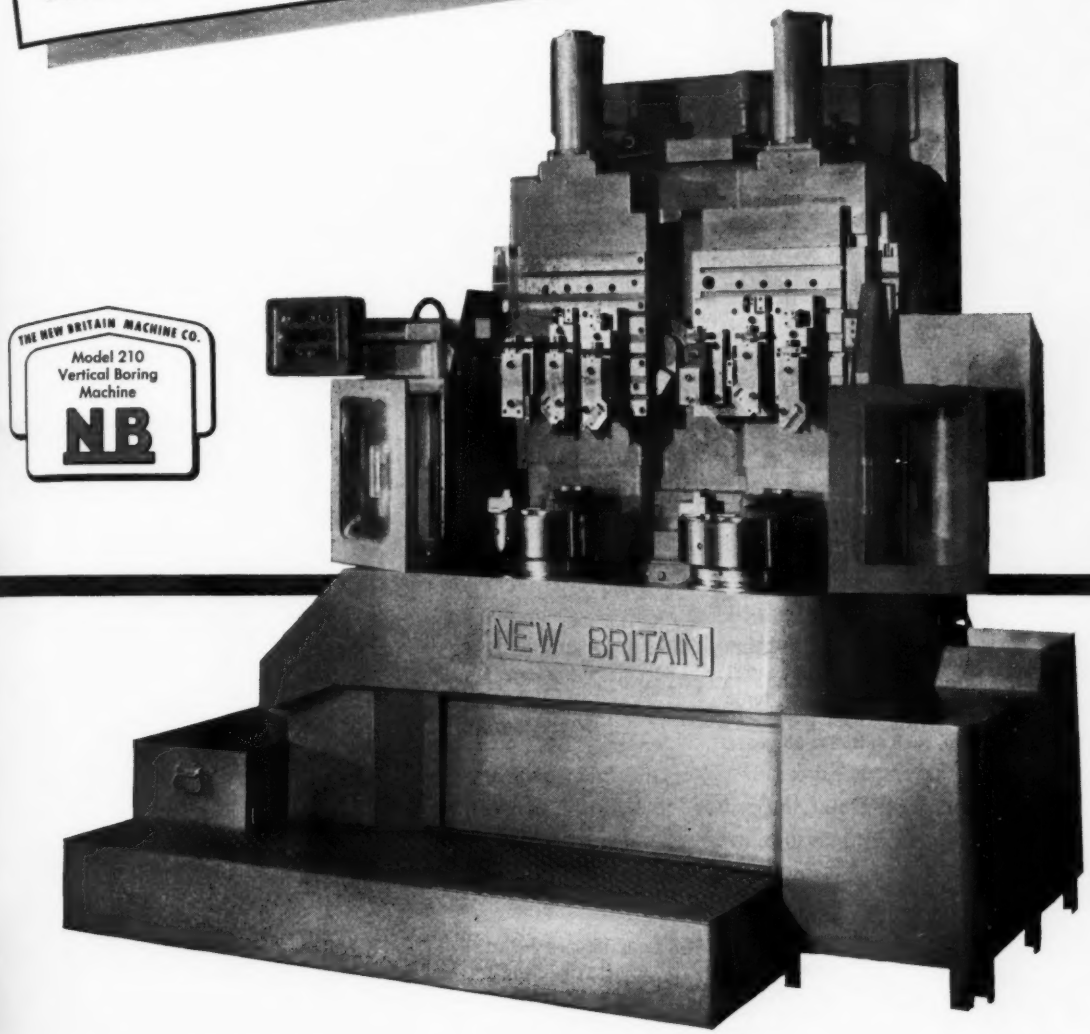
WHEREVER YOU TURN
long or short runs
NEW BRITAIN HAS THE MACHINE FOR YOU

THE NEW BRITAIN MACHINE CO.
Model 11/70
New Britain +GF+
Copying Lathe
NB



The original New Britain **+GF+** copying lathe has grown into an extensive line, to meet the demand for the wide variety of applications for its better copy-turning principle. Regardless of length of run or the variety of pieces you make, you can use the New Britain **+GF+** profitably. Basic advantages are: fast setup, inexpensive tooling, elimination of the chip problem, minimum operator fatigue, and dimensional accuracy with good surface finish to reduce grinding allowances. Optional features include automatic re-cycling, automatic loading and ejecting.

WHEREVER YOU TURN
or bore large, heavy pieces
NEW BRITAIN HAS THE MACHINE FOR YOU



Accurate cam control of tool paths is the essential to precision contour boring. The Model 210 New Britain precision *vertical* boring machine extends the speed, accuracy and fine finish of precision straight and contour boring and turning to a wider variety of work pieces. Perhaps this is the answer to excessive costs on some of *your* work.

NEW BRITAIN-GRIDLEY MACHINE DIVISION

The New Britain Machine Company • New Britain, Connecticut

OTHER NEW BRITAIN MACHINE TOOL DIVISIONS

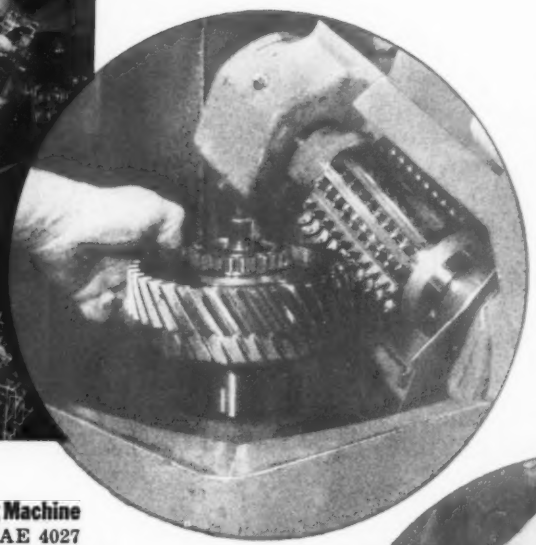
LUCAS MACHINE DIVISION
Cleveland, Ohio
Precision Horizontal Boring, Drilling and Milling Machines

HOERN & DILTS DIVISION
Saginaw, Michigan
Multiple Spindle Precision Finishing Machines

CIRCLE INFORM-A-GRAM KEY NO. 175

FOR MILLIONS OF GEARS A

...Fellows Sp



Fellows Heliguide Hobbing Machine cuts a 37-tooth gear in SAE 4027 carburizing steel on one spindle and a 27-tooth gear on the other. Production, each spindle: 35 gears per hour.

Fellows No. 4GS Gear Shaper cuts twelve 32-tooth, 7" P.D., ⅞" face helical gears per hour or seven 15-tooth, 6" P.D., 2-1/16" face spur gears per hour. Set-up shown is for 20-tooth helical or countershaft.

THE
PRECISION
LINE

A YEAR

Speed and Accuracy!

Over nine million gears a year for truck transmissions and other major sub-contracting jobs are made by the famous New Process Gear Company, Syracuse, N. Y. Their records show that because of their speed and accuracy their new Fellows Gear Production machines have lowered cutting costs by more than half!

For example, the Fellows Heliguide two-spindle hobbing machine at New Process cuts *six times* as many gears per hour as the previous machine. In addition, it saves approximately two hours in set-up time, requires only one operator to watch it because of its easy push-button operation. One man can operate four of these Fellows high-speed Heliguide Hobbing Machines.

New Process gets similar benefits from each of its ten Fellows No. 4GS Gear Shapers. Cutting 30% faster than the old machines, the No. 4GS Gear Shapers also hold to 25% closer tolerance without difficulty, saving on set-up time.

For full information about the complete Precision Line of Fellows Gear Production Equipment, get in touch with your Fellows representative. Write, wire or 'phone any Fellows Office.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 319 Fisher Building, Detroit 2
150 West Pleasant Avenue, Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Avenue, Los Angeles 45

THE PRECISION LINE

Fellows *Gear Production Equipment*

CIRCLE INFORM-A-GRAM KEY NO. 177

Keep Informed • CATALOGS BULLETINS • SPECIFICATIONS

PUBLICATION

For Ease and Convenience Use TOOLING and PRODUCTION Inform-A-Gram Cards

An Electro-Pneumatic Clutch is a feature of Series AA open back inclinable presses. They are used for a wide range of blanking, forming, drawing, perforating and combination die and automatic feeding operations. A bulletin discusses in detail the features of these presses. Get your copy of Bulletin 57-B from Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, or—**Circle Inform-A-Gram No. B1.**

Eliminate the Need for Lock Washers, jam nuts, safety wiring or other locking devices with Nylok nuts, bolts and screws. The locking principle used in these fasteners consists of a nylon plug imbedded permanently in the threaded section. The complete range of Nylok fasteners is listed and described in Condensed Catalog 11B from The Nylok Corp., 475 Fifth Ave., New York 17, or—**Circle Inform-A-Gram No. B6.**

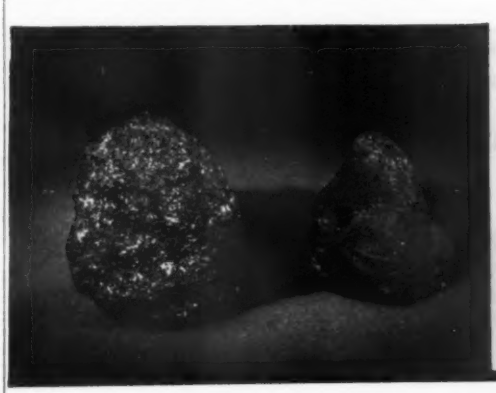
Check Wall Thickness of Tubing, locate holes and check slots and grooves with a new hole locating and tubing micrometer. It has a 0.089" dia anvil, small enough to enter a 3/32" I.D. hole or slot. The micrometer has a range of 0 to 1" by 1000ths. For further information, see a catalog sheet, Form 333, supplied by The Lufkin Rule Co., Saginaw, Mich., or —
Circle Inform-A-Gram No. B7.

"Media and Compounds" covers a wide variety of grades, grits and sizes available for precision barrel finishing. The folder details abrasive media showing the various kinds and discussing each. On the back page is a detailed list of compounds used in barrel finishing. The media and compounds are designed to meet the requirements of any and all barrel finishing departments regardless of size or operation. Speed-D-Burr Corp., 3613 San Fernando Rd., Glendale 4, Calif., or—**Circle No. B2.**

"Why A Multiple-Spline Socket Screw" explains the reasons for the use of the multiple-spline method of power transmission in a socket screw. Also described are their advantages and applications. These screws are available in set and cap screw types in sizes down to No. 0 wire size. Copies of Bulletin 723 can be obtained from The Bristol Co., Socket Screw Div'n, Waterbury 20, Conn., or—**Circle No. B3.**

Cylindrical Grinding Machine and Lathe Centers and Grinder Dogs are included in the Red-E line illustrated and described in a 16-page catalog. Presented are the newest products together with the data needed to simplify selection. The catalog also contains a grinding machine chart and a master chart for center hole design. Write to Ready Tool Co., 554 Iranistan Ave., Bridgeport 5, Conn., for copies of Catalog CD-56, or — **Circle No. B4.**

Low Temperature Silver Alloy Brazing is covered in "Easy-Flo and Sil-Fos." The bulletin tells what Easy-Flo and Sil-Fos brazing alloys are and what they do. It also discusses silver alloy brazed construction, design joints, six fundamental brazing steps and methods for heating and applying the alloys. Contact Handy & Harmon, 82 Fulton St., New York 38, for copies of Bulletin 20, or — **Circle No. B5.**



Different In Every Way! New 44 ALUNDUM abrasive (at right in illustration) *looks different* from ordinary aluminum oxide abrasive, with a finer grained surface that denotes greater density and toughness. That's because it's *made differently*, by special Norton-developed process. And that's why it *performs differently*, with its time-and-money-saving "Touch of Gold" advantages.

INTRODUCING...THE NEW

44 ALUNDUM abrasive

... most sensational, non-premium abrasive ever developed with new "TOUCH of GOLD" benefits for better, lower cost grinding

PREVIEWS

Circle postage-free Inform-A-Gram Key Number for your request

TOOLING and PRODUCTION'S Inform-A-Gram Section is a CARDload of Information

The "Green Design Book" enables users of large diameter gages to order gages simply by filling out an order blank. The engineering manual contains drawings of all models of the Boice line of indicator gages. Examples of gages on typical workpieces plus actual pictures are included. For your copy of the manual, contact Boice Gages, Inc., Staatsburg, N. Y., or —
Circle Inform-A-Gram No. B8.

Induction Brazing of Tools with Tocco induction heating equipment is discussed in a new bulletin. The types of tools and solder to be used and the points to follow to obtain a good braze are included. Also pointed out are the savings possible. For your copy of "Tool-Tipping with Tocco," contact The Ohio Crankshaft Co., Tocco Div'n, 3800 Harvard Ave., Cleveland 5, or —
Circle Inform-A-Gram No. B9.

"Engineering Manual E-56" describes the industrial applications of Oilite materials. Included are data on the properties and lists of Brinell and Rockwell ratings for these materials. A 12-page insert lists over 1000 standard Oilite sleeve, flange and thrust bearings, and cored solid bar and plate stock available. Copies of the manual can be obtained from Amplex Div'n, Chrysler Corp., Detroit 31, or — **Circle No. B10.**

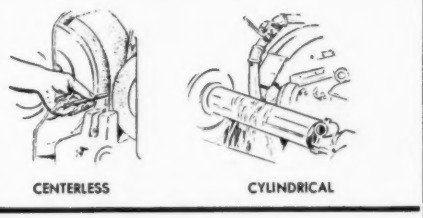
Solid Tungsten Carbide Drill Bushings are featured in Bulletin 102 issued by S & E Machine Products Inc., Bridgeport, Mich. Ordering information and specifications are given for headless and head press fit and fixed and slip renewable bushings. These bushings are reported to give from 50 to 600 times the wear obtainable from conventional type steel bushings.
Circle Inform-A-Gram No. B11.

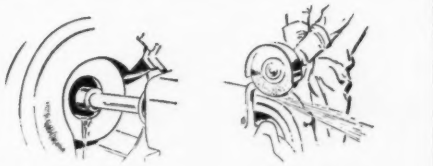
Mechanical Details and Operating Advantages of the ElectroGear line of horizontal guided-ram type surface broaching machines are found in a 4-page bulletin. Listed is machine data for the 12 models in the line. Also presented are photos and brief descriptions of typical jobs performed on these machines. Direct requests for Bulletin HM-56 to Colonial Broach & Machine Co., P.O. Box 37, Harper Station, Detroit 13, or—**Circle Inform-A-Gram No. B12.**

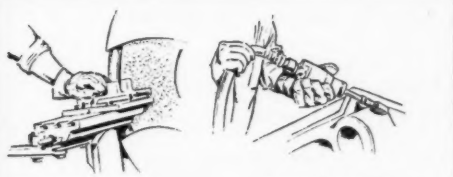
Measure Thickness from One Side Only with the Sonizon ultrasonic testing instrument. By means of thickness determination, Model SO-100 detects thin spots in walls, lack of bond, laminar type defects, and eccentricity in cored castings and cast iron pipe. A bulletin describes the instrument's operation and features and presents typical studies. Obtain copies of Form 14100-3 from Magnaflux Corp., 7300 W. Lawrence Ave., Chicago 31, or —
Circle Inform-A-Gram No. B13.

Fast, Accurate Grinding of metal parts and increased production are possible using precision grinding wheels. They are featured in Bulletin GP-56 released by Electro Refractories & Abrasives Corp., 344 Delaware Ave., Buffalo 2, N. Y. Covered are new developments in wheels for centerless, surface, internal and cylindrical grinding. Precision manufacturing methods are also discussed and plant facilities shown. **Circle No. B14.**

44 ALUNDUM abrasive gives excellent results on many grinding applications







. . . also a standout for saw gumming, ball grinding and thread grinding.

The big news about the new 44 ALUNDUM abrasive is this:

For a non-premium priced aluminum oxide abrasive, its performance, job range and service life are truly sensational.

It's a real work-horse abrasive — with extra ruggedness and durability that can take on a lot of tough grinding jobs and come back for plenty more. In more than 1100 tests, plants all over the country have reported that 44 ALUNDUM wheels have these advantages over ordinary aluminum oxide wheels:

LONGER LIFE — COOLER CUTTING
BETTER FINISH — HOLD FORM BETTER
FASTER RATE OF CUT
MORE PIECES PER DRESSING

Straight Facts

New 44 ALUNDUM abrasive is not a cure-all. For example, nothing can replace 32 ALUNDUM abrasive for precision grinding on high speed steel or CRYSTOLON* abrasive for most nonferrous grinding jobs.

But — on any job where ordinary aluminum oxide abrasive is good, "44" will give results ranging from equal to very much better. And — "44" has a much wider job range.

Take advantage of this outstanding new abrasive value. See your Norton Distributor for 44 ALUNDUM wheels in the bonds, wheel types and sizes you need. Or write to the nearest district office of NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

W-1737

NORTON
ABRASIVES

Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels
Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives
Sharpening Stones • Behr-ext Tapes

Vi-Speed Air Powered Presses are the subject of a bulletin issued by Van Products Co., Erie 7, Pa. Powerhouse air bench, air arbor and platen type air presses are covered. The bulletin illustrates and describes the presses and lists the specifications. **Circle No. B15.**

A Die Set Lubrication Gun is described and illustrated in a catalog sheet from Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Chicago 50. The long narrow shape of the gun makes it simple to reach guide post bushings from the front or side of the press. The nozzle furnished with the gun is designed for use with oil or grease. Further information is found in the catalog sheet supplied by the company, or — **Circle Inform-A-Gram No. B16.**

Cam Followers and Cam Yoke Rollers are detailed in Engineering Bulletin 103 published by Smith Bearing Co., 25 Bear Tavern Rd., W. Trenton, N. J. Given are load and life ratings as well as specifications for the high capacity stud, the regular type and the new cam yoke roller bearings. **Circle No. B17.**

CIRCLE INFORM-A-GRAM KEY NO. 180

A Fastener Brochure contains complete data on Fluid-Tight rivet series. Included are descriptions, photos and charts of the Pastushin self-sealing rivet principle. Shear strength test values are listed along with tables and photos defining fatigue and surge pressure tests. Copies of Catalog P1-5 are made available by Pastushin Industries, Inc., 5651 W. Century Blvd., Los Angeles 45, or — **Circle Inform-A-Gram No. B18.**

Interchangeable Index Plates available in a range of 2 to 36 spaces are a feature of the Universal dividing collet head. Among the tool's uses are milling keyways, punches, pinions, etc.; making one or two lipped cutters for high speed milling heads and checking parts. Request a bulletin with specifications and features, and photos of the attachments from Kuma Tool Co., 4712 S. Kenwood Ave., Chicago 15, or — **Circle Inform-A-Gram No. B19.**

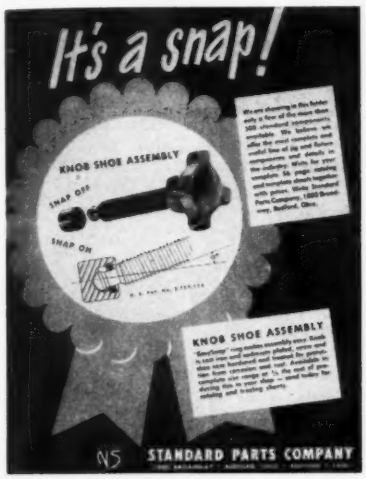
Case Histories are used to point out the facilities that The B. Jahn Mfg. Co., New Britain, Conn., has for producing tools and dies. The company produces "production proved" dies, progressive dies, tools, jigs, fixtures and gages. In addition, the firm offers special machinery, jig grinding and boring, and keller duplications. For details, see a bulletin provided by The B. Jahn Mfg. Co., or — **Circle No. B20.**

Spray Lubrication Systems for open gearing and slide surfaces are highlighted in an eight-page bulletin. Descriptions of manual and automatic systems and component equipment with schematic layouts as well as actual application views are included. Centralized spray lubrication assures improved gearing performance, elimination of downtime and increased production. Copies of Bulletin 60-A are available from The Farval Corp., 3249 E. 80th St., Cleveland 4, or — **Circle No. B21.**

The Scope of High Speed Movies for Industry is covered in "High Speed Motion Pictures at the Service of the Engineer." Five illustrated case histories are used to show how major firms have used such movies to solve engineering problems. Facts on lighting, speed selection and lenses for the Kodak high speed camera are included. Copies of the pamphlet are supplied by Eastman Kodak Co., Professional Goods Div'n, Rochester 4, N. Y., or — **Circle Inform-A-Gram No. B22.**

Exceptionally Versatile and Dependable Mechanized Welding is performed by an improved line of Unionmelt welding assemblies. A bulletin details Models UEH-1, UEH-2 and USH-2. Also presented are standard combinations for a wide range of applications. Copies of Form 50188 are made available by Linde Air Products Co., 30 E. 42nd St., New York 17, or —
Circle Inform-A-Gram No. B23.

No Pin Fastening is needed with the "snap on — snap off" knob shoe assembly. The knob shoe assembly is highlighted in a folder which shows a few of more than 500 standard jig and fixture components available. The snap ring feature makes assembly easy. For further details, get the bulletin, "It's A Snap!" from Standard Parts Co., 1000 Broadway, Bedford, O., or —
Circle Inform-A-Gram No. B24.



Fractional-Hp Thymotrol Drives are available from General Electric Co., Specialty Control Dept., Waynesboro, Va. The complete line of electronic adjustable-speed drives is adaptable with optional accessories to a wide variety of applications. The features of the drives, their control and ratings, and specifications are in a bulletin provided by the company, or —
Circle Inform-A-Gram No. B25.

Handle Fine Grade Polishing Paper with the John Crane portable polishing stand. It eliminates the difficulties of attaching and holding taut any polishing paper on a metal plate. A roll of the paper is held in a recess at one end of the unit and threaded across a steel plate. For further details, get Bulletin L-410 from Crane Packing Co., 6400 Oakton St., Morton Grove, Ill., or —
Circle Inform-A-Gram No. B26.

The Compelte Line of carbide tools manufactured by Schmarje Tool Co., Muscatine, Iowa, is featured in a new catalog. Included are illustrations, descriptions, specifications and prices for reamers, end mills, counterbores and other carbide tools. Also given is data on the company's facilities and growth. Copies of the catalog are made available by the company, or—**Circle Inform-A-Gram No. B27.**

Control Mechanical Actions with infinite switch settings with a new force control switch. Model FCS-C-12 which is available in nine capacities, is designed for compression loads. Dimensions, engineering details and specifications are included in Bulletin 28E from W. C. Dillon & Co., Inc., P.O. Box 3008, 14620 Keswick St., Van Nuys, Calif., or —
Circle Inform-A-Gram No. B28.

For Quick, Visible, Precise Measurements of extremely low starting and moving torques, use torque watch gages produced by Waters Mfg., Inc., Wayland, Mass. Models 6000B and 6500C Series measure within a range from 0.01 to 20 oz in. For details on the gages, get a bulletin from the company, or —
Circle Inform-A-Gram No. B29.

Recent changes and additions provide many bonus features.
Unobstructed perimeter (work from any side!)
Six Wheel Models
Capacities to 5,000 pounds.
LIFT
LOWER
TRANSPORT
with
PORTELVATOR®
The Handy HAMILTON Portable, Elevating Table
3 table surfaces
4 point support
Four Wheel Models
Special Designs too!
More Service for Less Money than Any other unit of equipment
A portable, height adjustable, steel table-truck-work bench! Used for die transfer, machine feeding, assembly (at best height, in best light). For lifting, lowering, transport of all compact, heavy loads. Saves "handling" accidents to both men and materials. Saves minutes for men wherever used.
Write*
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No. P-2408
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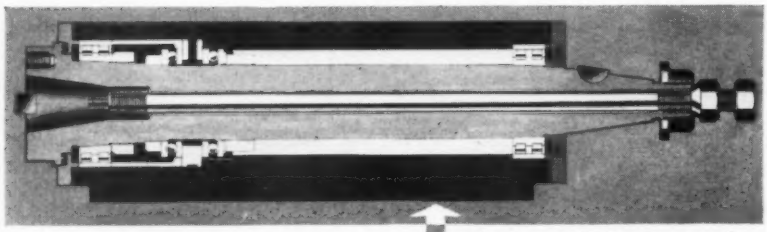
832 South Ninth Street
HAMILTON, OHIO
IT'S A Hamilton Tool
USE IT WITH CONFIDENCE
2408
CIRCLE INFORM-A-GRAM KEY NO. 181

An 85 Cfm Portable Compressor has been added to the Gyro-Flo line. The lightweight, portable Gyro-Flo 85 is a self-contained air power plant. There are no gears, clutches or belts. A bulletin gives complete details on the Gyro-Flo 85, including specifications. Direct requests for Form 2307 to Ingersoll-Rand Co., 11 Broadway, New York 4, or —
Circle Inform-A-Gram No. B30.

Bright Hardening, Carburizing and Dry Cyaniding, and similar heat treating operations which require temperatures to 1900°F are performed by a shaker hearth furnace. A wide variety of parts and materials, including stainless steel, can be processed. For details on its features, construction and operation, get Bulletin HD-850-A from Hevi Duty Electric Co., Milwaukee 1, or —
Circle Inform-A-Gram No. B31.

Model 2L Saddle Type Turret Lathe is detailed in a bulletin from Gisholt Machine Co., Madison 10, Wis. Shown and described are the lathe's features and optional attachments. Also listed are the specifications. Copies of Bulletin 1140-C are provided by the company, or —
Circle Inform-A-Gram No. B32.



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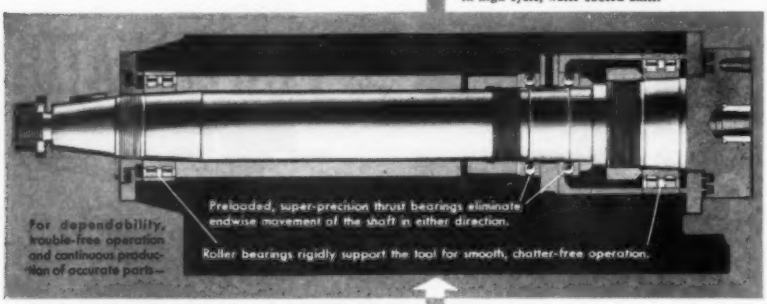
POPE
Heavy Duty
MILLING SPINDLE

See for yourself! Here is one sturdy package with a massive shaft, and double row cylindrical roller bearings and ball thrust bearings that support your cutting tools rigidly to do their best work.

POPE P-12000 Series Belt Driven Precision Milling Spindles are operable in any position. They come in sizes from 1 to 50 HP with standard milling machine tapers in the nose from #10 to #60. Bulletin S-8 gives complete dimensions. Let us mail you a copy.

POPE Heavy Duty Milling Spindles are also available in P-2500 Series, MOTORIZED, from 1 to 100 HP, totally enclosed, fan cooled; and in high cycle, water cooled units.


For dependability, trouble-free operation and continuous production of accurate parts—
Preloaded, super-precision thrust bearings eliminate endwise movement of the shaft in either direction.
Roller bearings rigidly support the tool for smooth, chatter-free operation.

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calls for this
POPE
Heavy Duty
BORING SPINDLE

Look it over! Here is a Boring Spindle capable of boring holes round within *millionths of an inch.* It produces fine surface finishes in the lower micro inch range.

POPE Super-Precision Heavy Duty Boring Spindles are available in both belt driven and motorized units to meet a wide range of speeds and horsepower. Send us your specifications for quotations.

Pope designs, engineers and builds
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No. 112

Specify POPE PRECISION SPINDLES
POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET • HAVERHILL, MASSACHUSETTS

CIRCLE INFORM-A-GRAM KEY NO. 182

Facts about Leaded Steel for seamless forged and rolled rings are given in Brochure SF-2 issued by Alco Products, Inc., Schenectady 5, N. Y. Hi-Qua-Led Steel cuts costs and speeds up machining of forged steel rings in gear cutting and in milling, drilling or boring operations. The brochure available from the company tells the advantages of the steel, shows test results and lists its applications.
Circle Inform-A-Gram No. B33.

Accurate Cutting of Any Metal is performed by Ty-Sa-Man friction abrasive, cut-off and long cut saws. A folder contains information on all the new models and the latest adaptations of the company's line. Also detailed are the construction features and specifications. Copies of Catalog 1235 are made available by Ty-Sa-Man Machine Co., 1039 White Ave., Knoxville, Tenn., or —
Circle Inform-A-Gram No. B34.

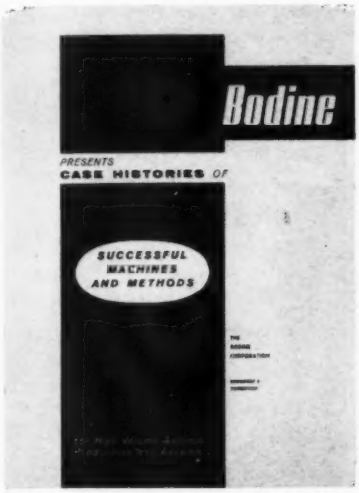
"Fluid-Power Steel Tubing" is a guide to specially processed steel tubing and cold finished steel bars for hydraulic cylinders and fluid lines. Engineering data provided for Rockrite cylinder tubing and Ryerson hydraulic fluid line tubing includes tolerances, mechanical properties and bursting pressures. Request copies of Bulletin 12-6 from Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, or —
Circle Inform-A-Gram No. B35.

A Chucking Capacity of ⅛" and ¼" is a feature of four new high speed grinders. These light, compact and powerful grinders are available with long or snubby nose, each in two speeds, 20,000 or 30,000 rpm. They are used for a wide variety of hand operations and for many special applications using special jigs and fixtures. Millers Falls Co., Greenfield, Mass., will provide copies of a circular with further information, or
Circle Inform-A-Gram No. B36.

Pressures up to 3000 Psi are handled by Oilgear two-way directional control valves. A bulletin gives the details of valve body construction and the functions of standard and special plungers. Each style is described and the type designation, dimensions and J.I.C. symbols are included. The Oilgear Co., 1598C W. Pierce St., Milwaukee 4, will supply copies of Bulletin 80200, or —
Circle Inform-A-Gram No. B37.

A New Ultrasonic Cleaning Apparatus for Small Parts has been developed by Branson Ultrasonic Corp., 37 Brown House Rd., Stamford, Conn. Model AP-10-B, the latest in the Sonogen(R) series is designed for bench-type operation in the washing of intricate parts. For further details on Model AP-10-B ultrasonic cleaner, obtain a circular from the company, or — **Circle No. B38.**

This Case History Book gives quick-reference tooling and production details, including sketches and photos, on 14 different types of work being produced on Bodine basic machines, with various combinations of



standard tooling methods and units. Featured in the publication is a new Bodine "do it yourself" service. For your copy, contact The Bodine Corp., Bridgeport 5, Conn., or — **Circle Inform-A-Gram No. B39.**

Measure Thickness to 0.000020" with Carson-Dice electronic micrometers. These micrometers which provide pressureless measurement, are applicable to hard or soft materials, conducting or non-conducting. They are unaffected by temperature, vibration, leveling or aging of tubes. Bulletin 4003 covers four models complete with principles of operation. Get your copy from J. W. Dice Co., Englewood, N. J., or — **Circle Inform-A-Gram No. B40.**

"Carbide Grinding Wheels" contains information on standard wheel types and sizes for various operations. In addition, the bulletin furnishes wheel sizes, plate specifications and Robertson blue print numbers of 23 plate mounted vitrified wheels for 30 grinding machines. Data is also included on grinding carbide tipped tools. Robertson Mfg. Co., Dept. 76, P. O. Box 848, Trenton 5, N. J., or — **Circle Inform-A-Gram No. B41.**

Over 100 Drafting Templates are featured in a new catalog released by A. Lawrence Karp, 16 Putnam Park, Greenwich, Conn. Included are electronics, automation, process and flow, gears, welding and tool design templates. Each of the many plastic templates is described and illustrated. **Circle No. B42.**

A Line of Gages for precision measurement is covered in a catalog from Rimat Gage Co., 21 W. Dayton St., Pasadena 2, Calif. Included are dial bore, groove diameter, groove width and special gages, inspection fixtures and inside micrometers. Each is illustrated and described and ordering information and specifications listed. **Circle Inform-A-Gram No. B43.**

Absolute Weld Consistency and Positive Reproducibility are produced by a predetermined electronic counter controlled welder. A bulletin contains an illustration and information on the welder. It also traces the development of control. Get your copy of Bulletin 338 from Sciaky Bros., Inc., 4915 W. 67th St., Chicago 38, or — **Circle Inform-A-Gram No. B44.**

5408

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HAMILTON VARIMATIC®
Super Sensitive
Variable Speed
Small Hole
Precision
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Are you fighting the never-ending battle of trying to produce exact holes on a drilling machine which, itself, is not built to precision tolerances? You are under no necessity to do so. For the difference in price between the cheapest bench type, small hole drilling machine and the Hamilton Varimatic is reckoned in pennies per day. And the Hamilton Varimatic (holes from .004" to 5/16" in all drillable materials) is super sensitive. Provides speeds, infinitely variable, between 840 R.P.M. and 9300 R.P.M. Is built to precision tolerances, and with the stamina to retain precision.

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CIRCLE INFORM-A-GRAM KEY NO. 183

A Simplified Ordering Section is included in the latest drill bushing catalog published by Ace Drill Bushing Co., Inc., 5407 Fountain Ave., Los Angeles 29. Listed are all sizes of A.S.A. and Ace standard drill bushings together with conversion tables. Also given is technical information. Obtain your copy from the company, or—**Circle Inform-A-Gram No. B45.**

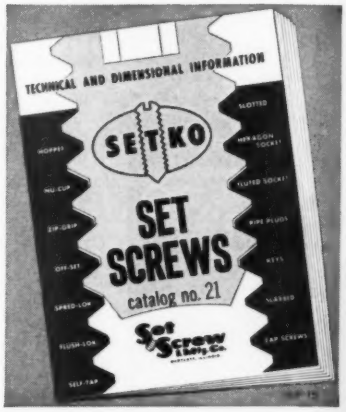
A Catalog on Design Service for special machinery, material handling, tooling, plant layout and automation is made available by Parmco Engineering Co., 8129 E. Nine Mile Rd., Van Dyke, Mich. Descriptive photos on plant, services and facilities are included. Copies of this self filing catalog are supplied by the company, or —
Circle Inform-A-Gram No. B46.

Save Time and Cut Tool Costs with t-nut and stud sets. These sets are engineered to fit individual machines. All sets provide stud requirements for at least four clamps from 3" to 15" high. Details and a selection chart are found in a circular issued by Montgomery & Co., Inc., 53 Park Pl., New York 7, or — **Circle Inform-A-Gram No. B47.**

CIRCLE INFORM-A-GRAM KEY NO. 184

Check the Flatness of Any Surface smooth and flat enough to reflect light with a plano-interferometer Horizontal-type Model D-308 has a guaranteed accuracy of 1/10 of a fringe, or one-millionth of an inch. It is designed for use on the production line as well as on the inspection bench. For further details on Models D-308 and D-309, get a copy of Data Sheet 1-402 from Davidson Mfg. Co., 2223 Ramona Blvd., West Covina, Calif., or —
Circle Inform-A-Gram No. B48.

Set Screws are highlighted in Setko Catalog 21 issued by Set Screw & Mfg. Co., Bartlett, Ill. Listed and described are every type of standard set screw and special types designed



to meet special conditions of vibration, close precision setting, resistance to tampering, chemicals or heat, etc. The catalog also features many new set screw developments.
Circle Inform-A-Gram No. B49.

Spray Clean electronic components, contact points, lapped surfaces, etc. with the Cobehn Spray-Clean technique. A booklet describes the technique which involves driving an atomised, warmed solution into every section of the part to be cleaned. Actual applications are shown as well as the equipment and solvent used. Contact Cobehn, Inc., Passaic Ave., Caldwell, N. J., for copies of the booklet, or —
Circle Inform-A-Gram No. B50.

Type U-4 Universal Grinding Machine is the subject of Catalog 231-1 from Norton Co., Worcester 6, Mass. Its versatility simplifies setups and its fast action reduces actual grinding time. The catalog details the features and advantages of the grinder. In addition, some of the jobs that the U-4 machine can perform are shown. Also included are an erecting drawing and specifications. **Circle No. B51.**

Three- and Four-Way Directional Control Valves have been built for fluid power systems up to 3000 psi. A bulletin details the valve body construction and the functions of standard and special plungers. Each style is described and the type designation, dimensions and J.I.C. symbols included. For further details, see Bulletin 80300 issued by The Oilgear Co., 1598C W. Pierce St., Milwaukee 4, or —
Circle Inform-A-Gram No. B52.

Heavy Duty Roll Grinders are the subject of Catalog V-56 issued by Landis Tool Co., Waynesboro, Pa. Type 30 grinder is available in 36", 44", 50" and 60" swings and center lengths from 10' to 24'. It grinds rolls from 45 to 82½ tons depending on the machine size. The catalog contains 32 photos, descriptions, specifications and standard and extra equipment.
Circle Inform-A-Gram No. B53.

A New Carbide Catalog has been published by Chicago-Latrobe, 411 W. Ontario St., Chicago 10. The 16-page catalog shows the complete line of carbide tools produced by the company. Also given is technical data. For your copy of the catalog, write to the company, or —
Circle Inform-A-Gram No. B54.

Heavy Blanking, Shearing or Embossing Work is handled by Model A Series blanking presses. They are built with short strokes and eccentric type crankshafts. A bulletin pictures the various models available in this series and lists the features. Also detailed is the construction of the presses. Complete details and specifications are found in a folder from Perkins Machine Co., Warren, Mass., or — **Circle No. B55.**

Tool Bits, Drill Rod and Ground Flat Stock are covered in a new stock list released by Firth Sterling, Inc., 3113 Forbes St., Pittsburgh 30. The 8-page list includes thicknesses, widths, lengths and decimal equivalents in all stocked sizes. Also given are descriptions.
Circle Inform-A-Gram No. B56.

New Standards of Efficiency and Economy in rubber pad forming are attained with direct acting hydraulic presses. A bulletin presents design details and application information on the Verson-Wheelon presses. Also shown are typical parts formed in the presses. In addition, the specifications are given. Verson Allsteel Press Co., 1355 E. 93rd St., Chicago 19, will provide copies of Catalog VW-55, or —
Circle Inform-A-Gram No. B57.

High Speed Precision Horizontal Plain and Universal Milling Machines are illustrated and described in Bulletin TM-UM published by Hardinge Brothers, Inc., Elmira, N. Y. In addition, the bulletin details the attachments and additional equipment. Also included are the specifications.
Circle Inform-A-Gram No. B58.

PRECISION GEARS
YOU who use small gears, (to 6" O.D. of the gear blank) can improve the performance of your product, through increased gear precision, without sacrifice of gear production.
YOU who use small, fine pitch, precision gears can increase your gear production without sacrifice of gear accuracy, or improve your gear accuracy without sacrifice of gear production.
The Hamilton Precision Gear Hobber, the hobber with a "reserve of accuracy," regularly holds work spindle and hob spindle runout to less than .0002", workspindle and tailstock spindle alignment to less than .0002", and this workmanship is maintained throughout the machine.
WANT FACTS?
Write for Bulletin No. 5419.
Address The Hamilton Tool Company
832 South Ninth Street,
Hamilton, Ohio.
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Hamilton Tool
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CIRCLE INFORM-A-GRAM KEY NO. 185

Automatic Industrial Positioning and conveyor control is provided by cam-operated indexing units. These units can reduce automatic machine design and construction time by as much as 50%. Copies of Bulletin 12A containing engineering data and details on the units are provided by Standard Tool & Mfg. Co., Arlington, N. J., or —
Circle Inform-A-Gram No. B59.

Rugged Strength is combined with streamlined styling in the Modern-Flow steel bench line. The first eight pages of Catalog 200 detail the new line of benches. Also covered in the catalog are steel shelving, drawers, bins and tiny parts cabinets. Request copies of Catalog 200 from Equipto Div'n, Aurora Equipment Co., Aurora, Ill., or —
Circle Inform-A-Gram No. B60.

A Complete Line of Gage Handles, Gage Blanks and Accessories available for immediate delivery affords an economical method of making plug and ring gages. The line is described and illustrated in a bulletin issued by Huron Machine Products, P. O. Box 146, 6252 Monroe Blvd., Dearborn, Mich., or —
Circle Inform-A-Gram No. B61.

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LONGEST WEARING DRESSING STICK MADE

A NORBIDE Stick of boron carbide — the hardest manufactured abrasive commercially available . . . will outlast hundreds of ordinary abrasive sticks . . . greatly reduce dressing dust nuisance too.

A couple of passes with a NORBIDE Dressing Stick is all it takes to clean up a wheel face, dress a radius or groove or touch up a cup or saucer wheel. And — with this conveniently sized stick — you can see more of the wheel and avoid costly overdressing.

Order a supply from your local Norton distributor or write for Form 1567 for more details. NORTON COMPANY, 47 New Bond Street, Worcester 6, Mass.

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NORTON PRODUCTS: Abrasives • Grinding Wheels Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives Sharpening Stones • Behr-cat Tapes

NORBIDE® ...The hardest manufactured abrasive commercially available!

CIRCLE INFORM-A-GRAM KEY NO. 186

Harden High Carbon and High Speed Tool Steel without scale, decarb or carburization using Lindberg Hydryzing furnaces. The complete line of these controlled atmosphere furnaces is described in a 4-page bulletin. Included are cross-section diagrams, specifications and performance data. For copies of Bulletin 97-HS, write to Furnace Div'n, Lindberg Engineering Co., 2450 W. Hubbard St., Chicago 12, or —
Circle Inform-A-Gram No. B62.

"Grinding and Polishing Appliances with 3M Coated Abrasives" illustrates how several appliance manufacturers are cutting costs and improving finishes. The booklet makes case history presentations of several abrasive operations, including prefinishing, weld grinding and blending, removing imperfections and finishing and polishing. Minnesota Mining and Mfg. Co., Dept. F6-189, 900 Fauquier St., St. Paul 6, Minn., will provide copies of the booklet, or—**Circle Inform-A-Gram No. B63.**

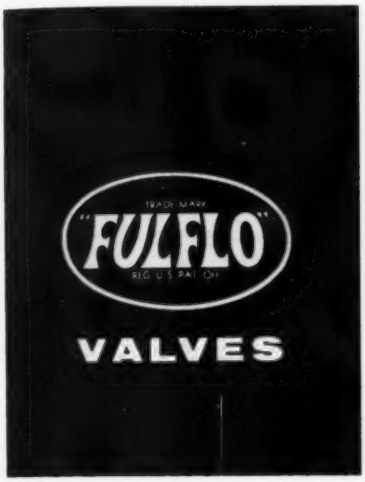
Two and Three Dimensional Milling on punches, dies and plastic molds of all types is performed by the Regent fluid motion duplicator table. It assures precision duplication and profiling on Bridgeport millers. For further information on the table, its features and the parts that can be produced, request literature from J. M. Kalins & Co., 1575 Railroad Ave., Bridgeport, Conn., or—**Circle Inform-A-Gram No. B64.**

Flow Charts, Engineering Information, operation and construction details, illustrations and prices are included in a condensed valve catalog. Presented are the latest designs in the ASCO line of 2, 3 and 4-way solenoid valves. A selection chart aids in choosing the right valve for a particular requirement. For your copy of Catalog 201, contact Automatic Switch Co., 391 Lakeside Ave., Orange, N. J., or —
Circle Inform-A-Gram No. B65.

Grinders and Screw Machine Tools are highlighted in a bulletin from Boyar-Schultz Corp., 2000 S. 25th Ave., Broadview, Ill. The bulletin covers both surface and profile grinders, listing features, specifications and optional equipment. The various screw machine tools available are shown and described. Get your copy of the bulletin from the company, or — **Circle No. B66.**

Equipment for Continuous Processing Lines is highlighted in a new 6-page bulletin. Covered are coil cars, payoff and coiling reels, levelers, press feeds, stitchers, slitters, bridles, shears and accessory equipment. Typical units are pictured and the scope of the company's service is touched on. Contact The Herr Equipment Corp., Warren, O., for copies of Bulletin 561, or —
Circle Inform-A-Gram No. B67.

Installation and Maintenance of Oil-Relief, By-Pass Hydraulic Valves are detailed in a Mechanical Data Book. Included are photos, charts, drawings and technical information. Also given is information on how to read Fulflo valve charts. Fulflo Specialties Co., Inc., Blanchester, O., will supply copies of the Mechanical Data Book, or —
Circle Inform-A-Gram No. B68.



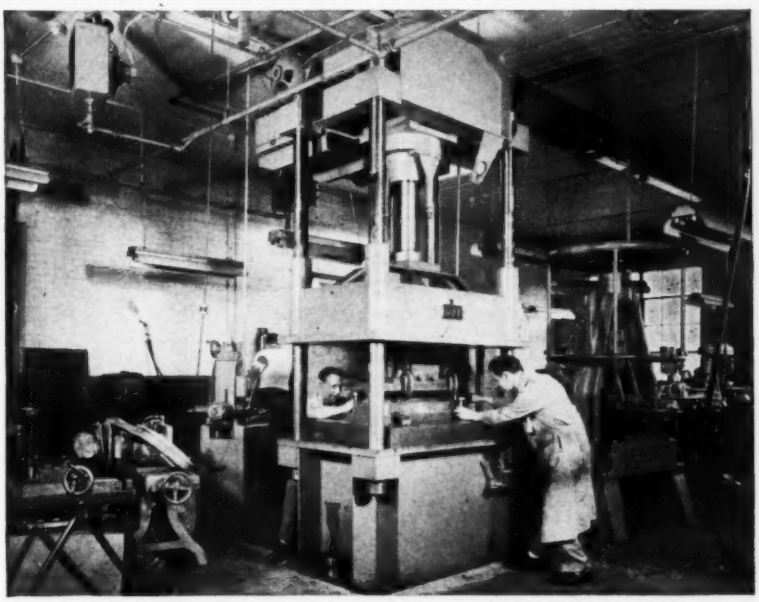
A 150-Sheet/Min Metal Sheet Feeder is described in a 6-page brochure. The feeder handles sheets ranging in size from 19" x 19" up to 36" x 44", and from 38 to 20 ga thick. Included in the brochure is information on eight major operating features, electrical specifications and a dimensional floor plan. For your copy, write to Dexter Folder Co., 330 W. 42nd St., New York, or —
Circle Inform-A-Gram No. B69.

Filing, Burring, Chamfering, honing, lapping and sawing are some of the operations performed by a portable electric tool with reciprocating action. A bulletin details the accessories that can be used with the tool for performing various operations. Also given are specifications, operating information and features. Copies of the bulletin are available from Acme Tool Co., 71 W. Broadway, New York 7, or —
Circle Inform-A-Gram No. B70.

Pneumatic Die Cushions are the subject of Form 119 now available from Dayton Rogers Mfg. Co., Minneapolis 7. Model HD die cushions featuring extra large piston rod and infinite height adjustment, are used for 200 psi duty. Installation instructions and diagrams, construction features and specifications are found in the bulletin.
Circle Inform-A-Gram No. B71.

Reduce Production Costs on all machines with multiple tooling by using Cy-Co-Trol tool control units produced by Royal Design and Mfg., Inc., 4133 E. 10 Mile Rd., Centerline, Mich. A catalog contains photos of the various models along with complete descriptions. One page is devoted to engineering information. Copies of the catalog are made available by the company, or —
Circle Inform-A-Gram No. B72.

Handling, Storage and Shipping are facilitated with folding-stacking Hamlintainer pallet-type steel boxes. These light-weight units are economical, efficient and durable. For further details and specifications, get Form 1275-A from Hamlin Metal Products Co., Akron 19, O., or —
Circle Inform-A-Gram No. B73.



The diemaker who made a nuisance of himself

This is the story of Three Star Manufacturing Co. — a custom diemaker who serves a number of manufacturing plants in Chicago.

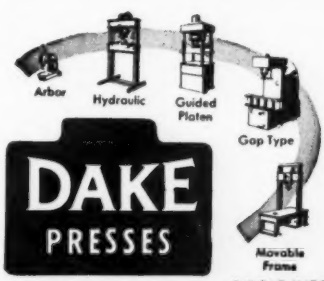
As in most such shops, his only means of trying out dies was a hand power screw press which sometimes needed six or seven men to get the needed pressure.

Large dies had to be tried out on his customers' production presses . . . which required drayage ($15 to $20 each way) and interruption of his customers' production. It meant both expense and nuisance to his customers and himself every time a die had to be tested.

Now he has ended the nuisance by installing the press shown above in his own shop. It not only saves time and money, but avoids the embarrassment of having workers in his customers' plants see and know that occasionally a die must be taken back for adjustment.

Specifications for DAKE single-acting and double-acting die tryout presses in eighteen electrically operated models are contained in Bulletin 330. Write today for your copy!

DAKE CORPORATION, 634 Seventh St., Grand Haven, Mich.



Send for Big New Catalog

DAKE CORPORATION
634 Seventh St., Grand Haven, Mich.
Please send me a copy of Dake Bulletin 330.
Name_____
Company_____
Address_____
City_____ Zone____ State_____

CIRCLE INFORM-A-GRAM KEY NO. 187

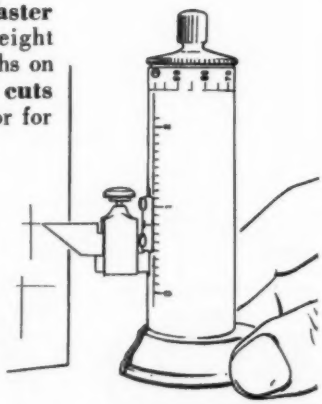
A Catalog of Decorating Equipment presents a guide for selecting the best spray gun action, type of mask or other equipment for each particular type of part. Parts are shown with the type of equipment best suited to decorating them. Direct requests for this catalog to Finish Engineering Co., Inc., 1115 Cherry St., Erie, Pa., or —
Circle Inform-A-Gram No. B74.

Eliminate Hand Sawing and Filing with a gear-less portable power hacksaw and file. It cuts all materials including stainless steel, sheet metal, bar stock, etc. The hack-saw and file will cut any shape and needs no starting hole. Further information is contained in a circular issued by Saw-Mor Tool & Blade Co., 549 W. Washington St., Chicago 6, or —
Circle Inform-A-Gram No. B75.

Valve-In-Head Cylinders have been developed by The A. K. Allen Co., 57 Meserole Ave., Brooklyn 22, N. Y. A bulletin covers Models SVS, SVE, SVA, VH, VH-SR, VAP and VAP-SR. Also given are the details on the cylinders, valves, mounts and rod clevis. On the back page are found dimensional diagrams.
Circle Inform-A-Gram No. B76.

with GREIST MICRO-HEIGHT® GAGE

Precision-built Micro-Height reads **faster than your micrometer!** It measures height direct from **zero at base** to 3″. Hundredths on barrel... thousandths on large head that **cuts reading time!** Attach your dial indicator for quick measuring between holes, surfaces!



CUT LAYOUT TIME!

Micro-Height also scribes like your vernier height gauge. Riser extends range to 9″.

Precision-built, satin-chrome finished Micro-Height Gage quickly pays for itself!

Call your distributor or write.

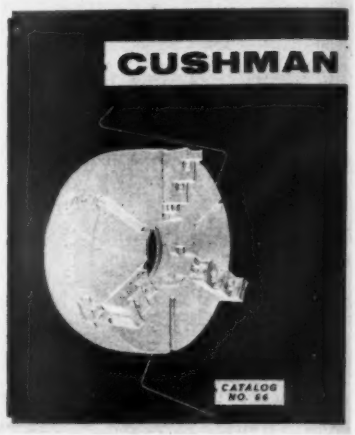
THE GREIST MANUFACTURING COMPANY, 4810 BLAKE STREET, NEW HAVEN 15, CONN.

Precision Products since 1871

CIRCLE INFORM-A-GRAM KEY NO. 188

A Precision Double Horizontal Spindle Grinder is highlighted in Catalog 2H30-55 released by Gardner Machine Co., Beloit, Wis. Model 2H30 grinder provides greater stability on precision jobs, increased production and easier setup and operation. The features and advantages are detailed in the catalog which also contains specifications. Obtain copies of the catalog from the company, or —
Circle Inform-A-Gram No. B77.

The Complete Line of manually operated chucks is listed in a new catalog published by Cushman Chuck Co., Hartford, Conn. Catalog 66-1956 includes detailed dimensional drawings and dimensions for all chucks and features a simplified method of chuck listing. Included are a new series of airtight chucks and descriptions of many special-purpose and Accra-Set chucks.
Circle Inform-A-Gram No. B78.



Step Up Production, Retain Accuracy and Bring Costs Down with the Mill-M-Matic bed type mill with automatic electric control. Medium or large parts are finished by conventional or climb milling. A bulletin with a fold-out section thoroughly covers the mill's features. The Motch & Merryweather Machinery Co., 888 E. 70th St., Cleveland 3, will supply copies of Bulletin 2200 complete with specifications, or —
Circle Inform-A-Gram No. B79.

Gun Drill and Tube Reamer Type Drills for use on drill presses, lathes, boring machines, deep-hole drilling machines, etc. are described in a new catalog sheet. In addition to detailing the drills, the sheet contains illustrations of the various nose grind styles. For copies of the catalog sheet, contact Eldorado Tool and Mfg. Corp., 342 Boston Post Rd., Milford, Conn., or —
Circle Inform-A-Gram No. B80.

The Advantages of Magnetic Force Welding to join difficult-to-weld critical materials are pointed out in Bulletin MF-100 issued by Precision Welder and Flexopress Corp., 3520 Ibsen Ave., Cincinnati 9. The bulletin gives the advantages, controls and adjustments, and features of magnetic force welders and discusses the principle of the machine. Also listed are the materials that the welder can join.
Circle Inform-A-Gram No. B81.

A New Line of Radial Drills for medium duty is covered in Catalog 5634 released by Western Machine Tool Works, Holland, Mich. The drills are available in arm lengths from 3' to 6' and 6, 9 or 18 spindle speeds up to 2000 rpm, with optional ranges. The catalog also details the construction and features of the drills, complete with specifications. Copies of the catalog can be obtained from the company, or —
Circle Inform-A-Gram No. B82.

Eliminate Seizure of Gage Blocks and Checking Fixtures with a new line of uniquely lapped black granite surface plates now being marketed by Collins Microflat Co., 2326 E. 8th St., Los Angeles 21. The lapping method provides a continuous bearing surface interspersed with micronic valleys. The surface plates are available in two or four ledge styles with 50 millionths overall accuracy. Complete information is in a folder released by the company, or—**Circle Inform-A-Gram No. B83.**

A Wide Range of Carbide Blanks for every cutting need is listed in a 12-page catalog. This catalog covers the complete line of Besly blanks

for increasing cutting efficiency. For prices, sizes, styles and shapes, request Catalog 851C from Besly-Welles Corp., 851 Dearborn Ave., S Beloit, Ill., or —
Circle Inform-A-Gram No. B84.

A Quick Facts Bulletin aids in selecting die-less duplicating equipment. Included are benders, shears, rollers, rod parters, brakes, press brakes, punch press, notchers and spring winders. Each item is illustrated and described, complete with specifications. Copies of the bulletin are available from O'Neil-Irwin Mfg. Co., Lake City, Minn., or —
Circle Inform-A-Gram No. B85.

A Complete Line of Cylindrically Ground Punches is available from stock from Pivot Punch and Die Corp., North Tonawanda, N. Y. A bulletin gives the features of the punches and complete ordering information. Also shown are the types of punches and shank styles available. For complete details, obtain the bulletin from the company, or —
Circle Inform-A-Gram No. B86.

Standardized Control Stations and units are detailed in the Pushbutton Guide from Westinghouse Electric Corp., Standard Control Div'n, Beaver, Pa. Included are standard and heavy duty, Oil-tite and special purpose pushbutton stations. The booklet covers the units, components, accessories and enclosures.
Circle Inform-A-Gram No. B87.

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DO IT YOURSELF ?

when you can get the extras at no extra cost

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This is the era of standardization. Porter Precision Products make HEAD PUNCHES and DIE BUTTONS from three types of the finest tool steel, and are available in any DECIMAL size.

IMMEDIATE DELIVERY assured from over 37,000 sizes in stock with Distributors in all principal cities.

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GET THEM WHEN YOU *NEED THEM*

Porter Precision Products also make BAL-LOK* Punches and Die Buttons. These too are available for IMMEDIATE DELIVERY. Any DECIMAL size. You pay nothing extra for the Fast Service, High Quality, or for Odd sizes.

"Still the best performer"

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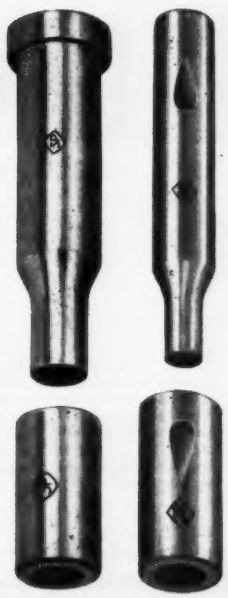
Reg*



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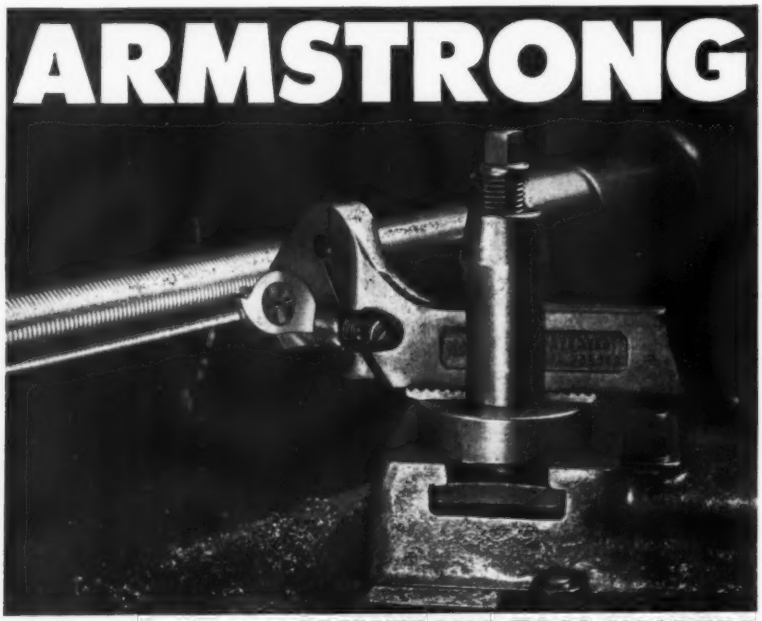
CIRCLE INFORM-A-GRAM KEY NO. 189

Collets equipped with a Neoprene "O" ring seal are now available from Benco Collet Mfg. Co., Cleveland 14. The seal keeps dirt out of the aperture between the collet draw tube and the spindle. A circular giving details and picturing various collets equipped with the "O" ring seal is provided by the company, or—
Circle Inform-A-Gram No. B88.

Power Press Brakes are the subject of Catalog S-1002 published by The Cyril Bath Co., 32400 Aurora Rd., Solon, O. Listed and discussed in detail are 21 features of these press brakes. Also given are the capacities and dimensions in chart form. Photos of typical applications are included as well as optional features and special equipment.
Circle Inform-A-Gram No. B89.

Hack Saw Blades and Metal Cutting Saws are highlighted in a catalog from H. K. Porter Co., Inc., Henry Disston Div'n, Philadelphia 35. Each item is illustrated and described. Included are specifications and other technical data on inserted tooth and solid tooth metal cutting and segmental circular saws. Also covered are metal band saws.
Circle Inform-A-Gram No. B90.



The ARMSTRONG Threading Tool takes interchangeable high speed steel form-cutters which require only flat top grinding to resharpen—always hold their true thread form.

Write for catalog

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Every rise in labor costs, every added tax, every overhead burden, every increase in cutting steel prices, every new, more costly machine tool, all increase the importance of ARMSTRONG TOOL HOLDERS to profitable operation.

ARMSTRONG TOOL HOLDERS reduce direct tooling costs to an absolute minimum—"Saves: All Forging, 70% Grinding, 90% High Speed Steel."

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ARMSTRONG TOOL HOLDERS are efficient for they embody a perfection gained by over 50 years of specialization in the development and refinement of tool holders.

ARMSTRONG TOOL HOLDERS are inexpensive because they are quantity produced by modern methods, for a world market . . . are used by over 96% of the machine shops and tool rooms . . . are carried in stock for your convenience by all industrial distributors of consequence.

Buy ARMSTRONG TOOLS from your Industrial Distributor

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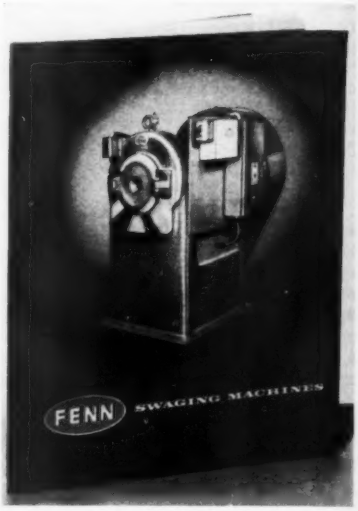
CIRCLE INFORM-A-GRAM KEY NO. 190

Composite Die Sections and clad aluminum bronze wear plates are covered in a catalog from The Ohio Knife Co., Cincinnati 23. Shown are two of the major operations in the cladding process and typical cross sections furnished various machine tool companies. Also listed are the various standard cross sections available. Included are standard die wear plates, clad bronze ways and Bronzoil.
Circle Inform-A-Gram No. B91.

Swaging Equipment is the subject of illustrated Catalog SM56 from The Fenn Mfg. Co., Newington, Conn. It contains basic technical information about the rotary swaging process, its



principles of operation and advantages. Also explained are many typical and unusual applications. In addition, the catalog presents an accessory section and specifications.
Circle Inform-A-Gram No. B92.

The Microhoning Service and Equipment Catalog supplied by Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 38, has been revised. The catalog covers a complete engineering service. Discussed are the Microhoning process, cylindrical Microhoning machines, automated and flat Microhoning and services. For your copy of the catalog, contact the company, or—
Circle Inform-A-Gram No. B93.

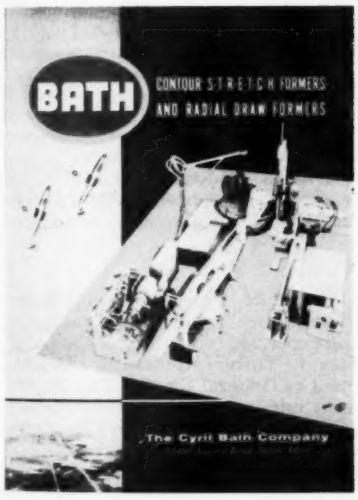
Vapor Degreasing with Triclene D is the subject of a booklet from E.I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. Shown is typical modern degreasing equipment currently used to save time and costs in metal cleaning. Also given are physical and chemical properties and performance data on Triclene D. Also covered are vapor degreasing cycles and costs.
Circle Inform-A-Gram No. B94.

A Heavy Duty Air Hammer which delivers up to 2200 blows/min at less than 80 psi is available from Superior Pneumatic & Mfg., Inc., 4758 Warner Rd., Cleveland 25. This hammer can be operated with one hand. A patented safety chuck locks the tool in six positions. For further details and specifications, get a circular from the company, or — **Circle Inform-A-Gram No. B95.**

Up To 12 Circuits in Sequence are opened or closed by the Multipulse repeat cycle timer. The timer is designed for applications such as sequence starting of several motors, timed sequencing of automatic machines, etc. Bulletin 323 with features, time range chart, an electrical diagram and dimensions, is provided by Eagle Signal Corp., Moline, Ill., or—**Circle Inform-A-Gram No. B96.**

Up to 80% Faster Inspection for production lines, toolrooms and laboratories is provided by Nikon optical comparators. They are ideal for a wide variety of small parts, irregularly shaped components, etc. For details on the comparators and specifications for the models available, request copies of a circular from Nikon Inc., 251—4th Ave., New York 10, or — **Circle No. B97.**

Radial Draw Formers are emphasized in a 60-page catalog issued by The Cyril Bath Co., 32400 Aurora Rd., Solon, O. Presented are illustrations and diagrams of radial-drawing forming machines handling work up to 300 or more tons and

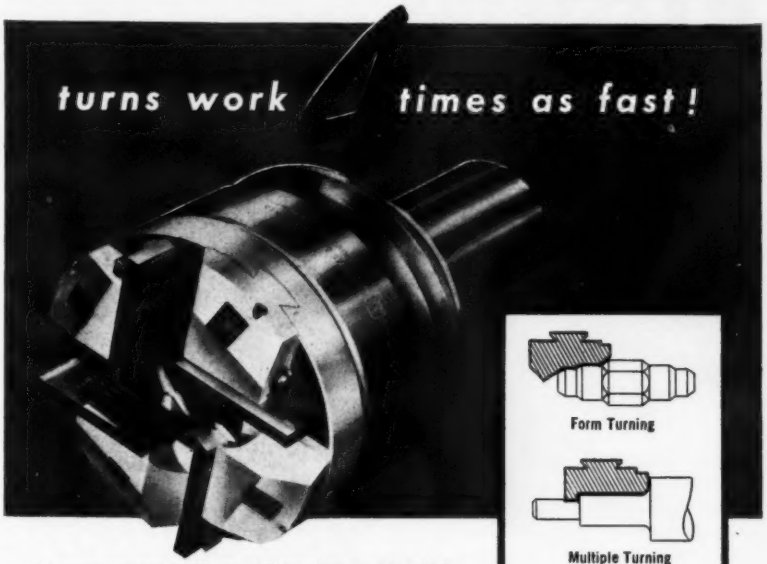


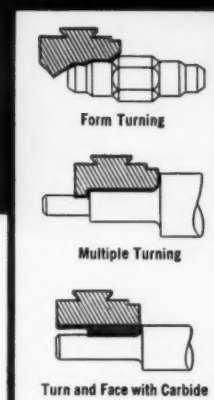
semi-automatic ones producing work for automobile trim at the rate of 600 pcs/hr. Also covered are press brakes and tangent benders. Obtain copies of "Contour Stretch Formers and Radial Draw Formers" from the company, or — **Circle Inform-A-Gram No. B98.**

"Wet Method Is Best" describes methods of collecting and controlling magnesium alloy dust and fumes. Safe, efficient and economical methods of protecting plants and foundries against the possible hazards that can occur while processing magnesium are pointed out. In addition, the design and operation of several Peters-Dalton dust and fume collection systems are described. For your copy of the brochure, contact Peters-Dalton, Inc., 17900 Ryan Rd., Detroit 12, or — **Circle Inform-A-Gram No. B99.**

The Manufacturing and Engineering Facilities of The United States Graphite Co. for producing Gramix high quality, low cost sintered metal parts are detailed in a handbook. Covered are the manufacturing process and design considerations. Included are tables of suggested tolerances, bearing loads, running clearances and press fit values, and wall thickness vs length and minimum tolerance charts. Copies of Engineering Handbook G-55 can be obtained from The United States Graphite Co., Div'n of Wickes Corp., Saginaw, Mich., or — **Circle Inform-A-Gram No. B100.**

Die Head
HOLLOW MILLING





Carbide chasers in J & L Die Heads have reduced hollow milling time still another 80% over H.S.S. chasers, while holding surfaces to 10 RMS.

In most cases, hollow milling chasers in J & L Die Heads will do plain turning, multiple turning and contour forming four times faster than any single point tooling method. (Each of the four chasers in the set does the work of a single point tool.)

Important!

Money-saving hollow milling chasers are held in the same J & L Die Heads that guarantee Class III threads — every time.

write for folder #5433

JONES & LAMSON

Class III Guaranteed Not Sometimes, but Everytime!

JONES & LAMSON MACHINE COMPANY, 519 Clinton St., Dept. 710, Springfield, Vt., U.S.A. J&L THREAD TOOL DIV.

CIRCLE INFORM-A-GRAM KEY NO. 191

MEN YOU SHOULD KNOW

The appointments of **Howard W. Grossbohlin** as head of the tube and component department, and **Robert M. Peterson** as assistant chief engineer in charge of electronics engineering have been disclosed by Stromberg-Carlson, division of General Dynamics Corp.

◆

William H. Graves has been named to the board of directors of The American Forging & Socket Co. The announcement was made by **Goodloe H. Rogers,** company president.

T. E. Rodgers is the new works manager for Seneca Falls Machine Co. **R. M. Wheeler** has been made executive assistant and **V. L. Percy** has been named chief engineer.

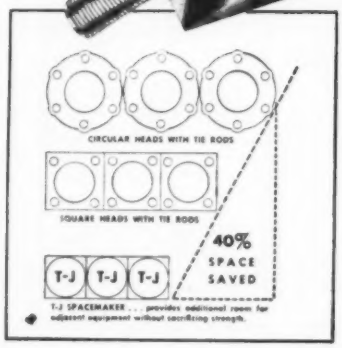
◆

The election of **R. S. Bright** as a member of the board of directors has been announced by Chrysler Corp. **Paul C. Ackerman** has been elected a corporation vice president. Also disclosed is the appointment of **James C. Zeder** as special adviser to the president.

Saves 40% Space!

STRONGER, TOO

Than Outmoded Tie Rod Cylinders!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SQUARE HEADS WITH TIE RODS
40% SPACE SAVED
T-J
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T-J SPACEMAKER . . . provides additional room for adjacent equipment without sacrificing strength.

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Offer All The Extras As Standard!

- NEW *exclusive* Ingenious Cushion Designs . . . Super Cushion Flexible Seals for Air . . . New Self-Aligning Master Oil Cushion
- Compact design eliminates tie rods, saves up to 40% space
- Proven Performance . . . with Extra High Safety Factor
- Hard Chrome Plated Bodies and Piston Rods (Standard, at no extra cost).
- Oil pressure to 750—AIR to 200 P.S.I.

You'll find many answers to automation in your plant with T-J Spacemaker Cylinders! Designed with years-ahead features for top performance and dependability. Wide range of styles, capacities . . . for all kinds of push-pull-lift operations . . . reduces man-hours and costs! Write The Tomkins-Johnson Co., Jackson, Mich.

MEMBER OF THE NATIONAL FLUID POWER ASSOCIATION

T-J TOMKINS-JOHNSON

NEW LITERATURE . . . send today for new Bulletin with complete details of Spacemaker line.

CIRCLE INFORM-A-GRAM KEY NO. 192

Three promotions have been disclosed by Cargill Detroit Corp. **Richard O. Straight** who joined the organization in 1951 as its first employee, has become manufacturing manager. He is succeeded as sales manager by **William H. Ducker. William M. Peterson** is the new assistant manufacturing manager.

◆

John F. Blamy has been appointed chief inspector of Pontiac Motor Division of General Motors Corp., succeeding **W. H. Vann** who will become quality coordinator. In his new position, Mr. Blamy, who joined Pontiac in 1930, will be responsible for the division's product quality control program. Mr. Vann who has been with the Pontiac organization since 1926, will coordinate quality control in various divisions supplying Pontiac.

◆

O. B. Wilson is filling the post of vice president of the Brown Instruments Division of Minneapolis-Honeywell Regulator Co. He is also continuing in his current position of general sales manager for the division.

◆

Andrew V. Weizel has been named chief metallurgist for the two plants of Cleveland Cap Screw Co. His new duties also include supervision of pickling and annealing of material for the manufacture of fasteners, and heat treating of finished products. **Michael Stasko** has been made assistant metallurgist, serving as assistant to **George E. Kaufman,** product engineer. His work entails quality inspection of material in production and finished products in the fastener lines.

◆

Fritz A. Zander has been promoted to executive vice president of Micrometrical Mfg. Co.

◆

Harold M. Priestly has joined the metallurgical unit of the materials and processes laboratory of the Large Steam Turbine-Generator Department of General Electric Co. He has been employed in the development of high temperature alloys for steam turbine-generator applications.

◆

The promotion of **Milton J. Steffes** to general manager of sales and engineering for Super Tool Co. has been announced by **Kenneth R. Fisher,** president. Mr. Steffes has been associated with the company for 14 years in various executive engineering capacities.

MEN YOU SHOULD KNOW

Ernest Schleusener has been elected vice president, treasurer and a director of Rodney Hunt Machine Co. Mr. Schleusener who recently joined the firm, has been with Mueller Brass Co. At Rodney Hunt, he will have overall responsibility for manufacturing and financial matters.

◆

Edward J. Shages has been named vice president and manager of the cutting tool and gage divisions of Pratt & Whitney Co., Inc. He has been associated with the company for 27 years. **James B. Wilkie** will manage the gage division. He will be in charge of manufacturing of all Pratt & Whitney gages as well as the research, development and engineering programs of the division.

◆

Fritz Koenig has organized a new company, Opto-Metric Tools, Inc., which he will head as president and general manager. The company will specialize in domestic and foreign optical measuring tools. Mr. Koenig formerly was with Geo. Scherr Co.

◆

The new manager of research and development for Valvair Corp. is **Domenic A. DiTirro.** He is directing new product design, development and testing, and supervising the activities of the newly established research and development department.

◆

The appointment of **E. A. Williams** as vice president and general manager of H. W. Loud Machine Works, Inc., has been announced by **Alanson R. Loud,** president. Mr. Williams moves into this position following more than 14 years experience in top level aircraft planning and production at Lockheed Aircraft Corp. He will also serve as a member of the corporation's board of directors.

◆

Paul Jones is serving as works manager of the Borg & Beck Division of Borg-Warner Corp.

◆

George E. Brumbach has taken over as chief metallurgist of The Carpenter Steel Co. He will assist **Dr. Carl B. Post,** vice president and technical director, in the management of all metallurgical activities for the company. Mr. Brumbach who has had extensive experience in steel mill metallurgical control and inspection, has been associated with the Carpenter metallurgical and research department since 1933.

The new president of Westinghouse Air Brake Co. is **A. King McCord.** He succeeds **E. O. Boshell.**

◆

Paul N. Gillon has been appointed manager of the basic research branch of the research laboratory of The Carborundum Co. In his new position, Mr. Gillon will direct a basic research group. He has also been designated as project coordinator. Mr. Gillon was formerly in charge of the Office of Ordnance Research at Duke University.

Standard Pressed Steel Co. has appointed **Sidney A. Matthews** to serve as machine tool analyst. He will evaluate, recommend and coordinate the purchase, delivery and installation of all new machine tools purchased by the firm. Mr. Matthews has been employed by the company since 1920.

◆

Frederick G. Stroke is manager of operations for Bettinger Corp. He is in charge of engineering development and sales of products in the fields of nuclear energy and rocketry.

because- The bodies of Futurmill cutters are built to hold solid carbide blades with maximum tool rigidity—and these same cutter bodies may be used for many various milling and material applications. They cut tough alloy steels, soft or brittle materials; they perform most accurately at the highest feeds and speeds obtainable; they eject chips properly; they may be used indefinitely.

because- By employing inexpensive standard solid carbide lathe blanks and "throw-away" blanks as the cutting element (blades) the Futurmill model X reduces the perishable expense (or cost per cubic inch of material removal) to the lowest milling costs known **TODAY!**

because- Coupled with the Futurmill principles of ease and accuracy of indexability and the elimination of cutter or blade grinding and regrinding, model X presents the metal worker with a tool for modern milling requirements . . . without the burdens of the past.

For further information and literature; write

futurmill, inc. DETROIT MILLING CUTTER division

28625 Grand River • Farmington, Michigan • Greenleaf 4-5745—4-8450

CIRCLE INFORM-A-GRAM KEY NO. 193

LAYOUT FLUID
FOR ANY METAL

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FREE SAMPLE

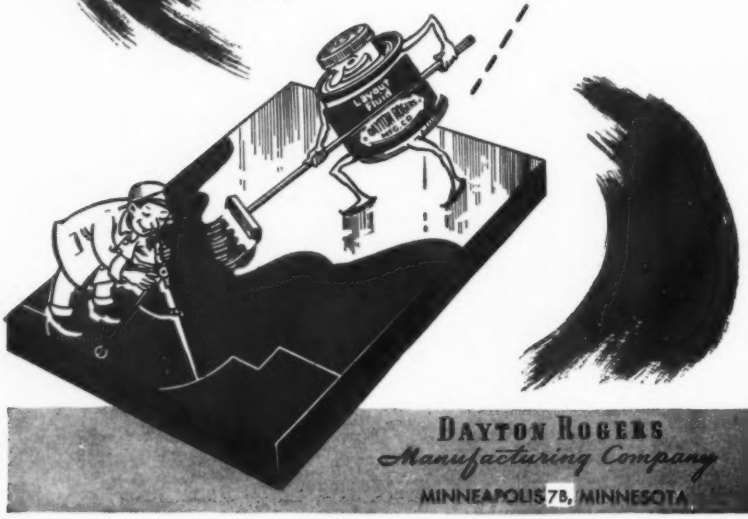
Your local supply house carries Dayton Rogers', Layout Fluid.

Applicable to all metal. One merely wipes the surface clean and then brushes on the Layout Fluid.

Dries Instantly. No waste. Scribed lines are pronounced and contrast to the dark blue background, thus relieving eyestrain.

Assures greater accuracy and speeds up work. You will save time and money on all layout jobs.

A sample is waiting for you. Send for it today.



DAYTON ROGERS
Manufacturing Company
MINNEAPOLIS 7B, MINNESOTA

CIRCLE INFORM-A-GRAM KEY NO. 1941

For Better Knurling

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KNURLMASTER

Hand Knurler

$13.50

No distortion — even on ⅛" stock! MODEL "C"

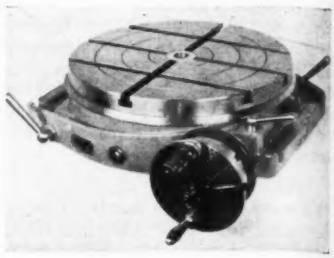
For small production runs on ⅛" to 1" stock. Exclusive screw design gives perfect knurl pattern. Furnished with 3 hardened knurls of standard ½" dia. Forged steel frame is self-centering. Write for illustrated folder.

DEALERS INQUIRIES INVITED

ROCKWIN MANUFACTURING CO.
80A Magnolia St., Westbury, L. I., N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1942

WALTER



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With and Without Dividing Discs

- READABILITY: 6 SECONDS.
- CONSTRUCTED FOR LONG LIFE.
- MAINTAIN PRECISION.
- AVAILABLE IN 10", 12½", 15¾", 19¾", 25", 31".

Also many types of Universal Precision Dividing Heads and Attachments for most economical production.

Test reports furnished with literature.

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CIRCLE INFORM-A-GRAM KEY NO. 1943

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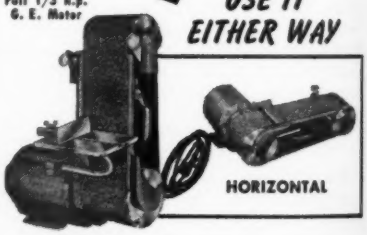

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CIRCLE INFORM-A-GRAM KEY NO. 1944

Tiny Parts Get Distortion-Free Heat Treating

In addition to offering a bright finish and distortion-free heat treatment, small precision stainless steel parts can be finish machined before heat treating when Hamilton Watch's new process is utilized.

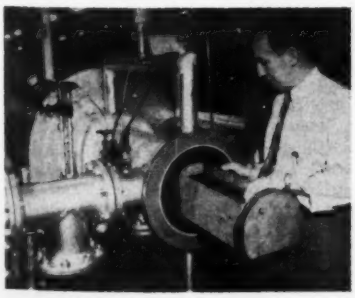
Developed by the Allied Products Division of Hamilton Watch Co. of Lancaster, Pa., the process permits heat treating even minute stainless parts to any desired degree of hardness or toughness without causing discoloration of their fine finish or any dimensional distortion.

Fig. 1. A close-up of some of the minute stainless instrument and aircraft parts heat treated by Hamilton's non-discoloring and distortion-free process.

The process is achieved by precise control of the heat treating furnace atmosphere through special preparation of the atmosphere gases. The furnaces are especially designed for gas tightness to prevent entrance of any contaminants.

A unique feature of the Hamilton process, an outgrowth of the company's development work on heat treating stainless watch parts, is that it not only prevents distortion of the minute parts, but can also be arranged to produce controlled amounts of growth or shrinkage in dimensions of the parts. The company will do contract heat treating in their plant.

Fig. 2. Tray full of assorted miniature precision stainless parts are placed in the special heat treating furnace at the Allied Products Division of Hamilton Watch Co.



Seamless Tubing Eliminates Center Boring Operations

Unit Crane and Shovel Corporation, Milwaukee, estimates a savings of 2¼ man-hours each in the manufacture of vertical traction shafts from seamless steel tubing. The tubing eliminates a center boring operation, and was selected for the application by Unit engineers upon the specification recommendations of Ohio Seamless Tube Division of supplier.

Used in the Unit line of excavating and handling equipment, the machined tubing shaft transmits power to operate the crawler tracks or wheels of shovels, cranes, clamshells, draglines, trenchers, and excavators.

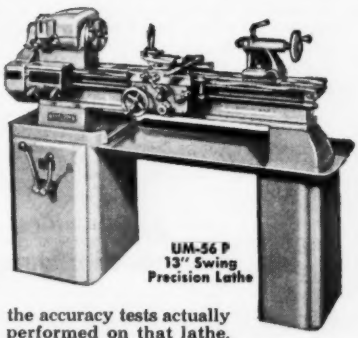
SHELDON Precision LATHES

for the size Lathes You Need Most

Sheldon lathes are built in the sizes you need most, for toolroom and production jobs. They are available with swings of 10", 11" and 13"... in varying bed lengths with 18" to 48" center distances . . . and . . . in your choice of pedestal, cabinet or bench mountings.

Powerful, all-V-belt, drive units—either the standard 8-speed (or 16-speed) E-drive; or the production favorite, a rapid, lever-shift U-drive. Where higher spindle speeds are desired, the standard E-drive can be built to provide speeds up to 2,000 r.p.m.

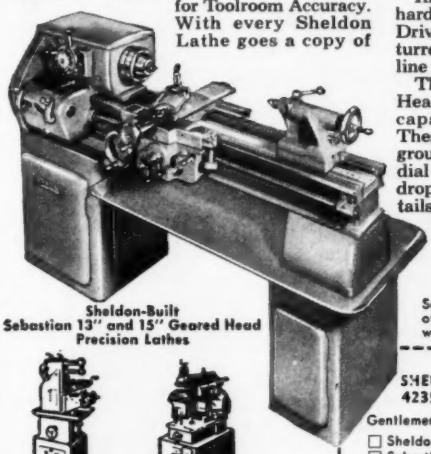
All Sheldon Lathes have handscraped, built-in precision. Each lathe is guaranteed to meet or surpass the American Standards for Toolroom Accuracy. With every Sheldon Lathe goes a copy of the accuracy tests actually performed on that lathe. (19 checks).



UM-56 P 13" Swing Precision Lathe

Important optional features include: hardened bed ways, L00 Long Taper Key Drive spindles, 4" D1 Camlock spindles, bed turrets, taper attachments and a complete line of toolroom and production accessories.

The new Sheldon-built Sebastian Geared Head Lathes have greatly increased work capacity and many advanced features. These include a wide, heavy, hardened and ground bed . . . easy shifting spindle speed dial . . . 60-pitch gear box . . . independent drop lever apron clutches . . . cam-action tailstock clamp . . . and, automatic lubrication in the headstock and apron with "1-shot" lubrication of carriage.



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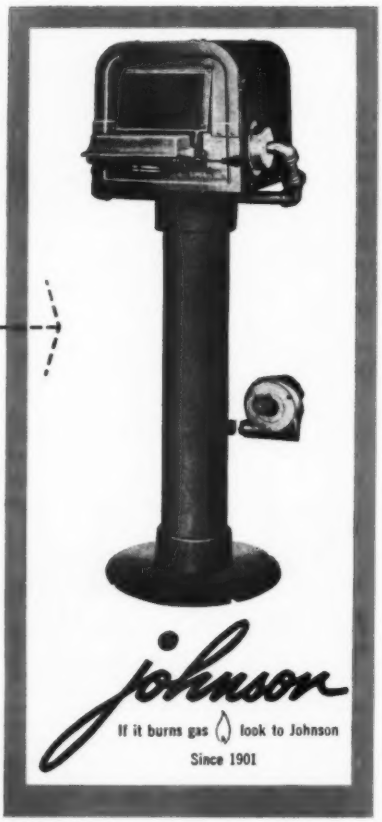

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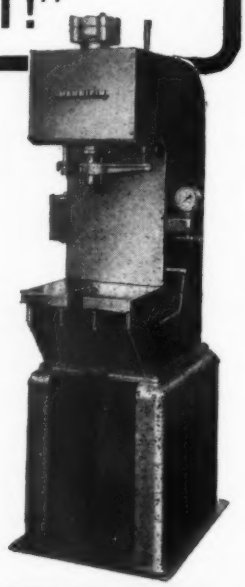

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*Price complete with motor and starter F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

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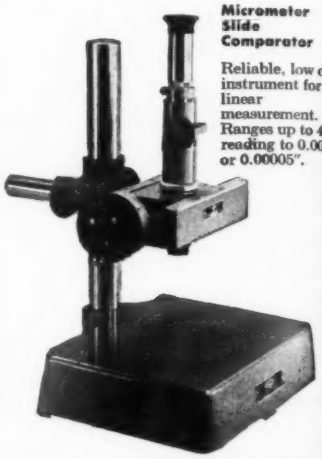
CIRCLE INFORM-A-GRAM KEY NO. 1962



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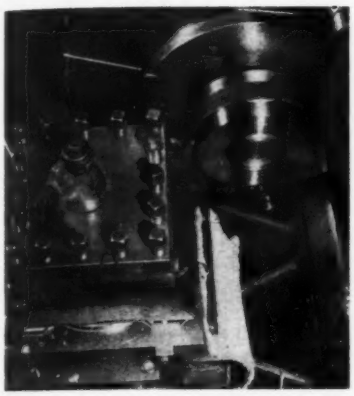
CIRCLE INFORM-A-GRAM KEY NO. 1963

THROW-AWAY INSERTS DRASTICALLY CUT TOOLING COSTS

Tool costs have been reduced to about one-tenth of former costs in the machining of 7" dia forged steel tapered rollers by the Koehring Southern Company, Chattanooga, Tenn., and machining time cut to less than one-third of the time formerly required. The tool saving, which amounts to $11.70/100 rollers, was achieved by a change in the type of carbide tools and does not include additional savings that are realized from the increased production rate and elimination of tool regrinding costs.

Use of Kendex tooling with square "throw-away" button inserts having eight cutting edges gave these advantages over standard style GR and GL brazed tip carbide tools. The



Kendex clamped insert tooling made by Kennametal Inc. permitted an increase in machining speed from 353 to 620 SFM with feeds stepped up from 0.012" to 0.016" for turning and from 0.006" to 0.020" for facing. Depths of cut were the same as before, ⅛" for turning and ¼" for facing. As a result the machining time was cut from 2.69 min to 0.73 min/pc.

The machining operation consists of turning a 7°40′ taper on a 2.75" long forged roller surface which is 6¼" dia on one end and 7" dia on the other end, and facing the smaller side. SAE 1045 steel of 240-270 Brinell hardness is used in the roller. Machining is done on a Warner & Swasey No. 3 lathe with Kendex Style KSBR-85 for turning and KSBL-85 for facing, using Grade K4H inserts.

Insert life is 58 pcs/cutting point on the turning operation and 80 pcs on facing. Since eight cutting edges are available on each square insert, the total insert life is 464 on the turning operations and 640 for the facing operations. With brazed tip tungsten carbide tools, the average number of pieces per tool grind was 10.3 turned and 7 faced. With 10 grinds available, the total tool life was 103 for turning and 70 for facing.

The former tool cost per piece, based on a brazed tool cost of $5.42 each, was 13¢ for turning and 7.74¢ for facing. With Kendex square "turn-over" button inserts costing $2.47 plus $1.15 (the prorated holder charge based on 1/10 of the tool holder price) or $3.62, the tool cost per piece is 1.3¢: 0.78¢ for turning and 0.56¢ for facing. The resultant machining cost was, therefore, reduced from $13 to $1.30/100 pcs. Further savings are derived from faster production and elimination of tool regrinding.

"Maraset" is the new trademark selected by Marblette Corp. for its line of epoxy resins for plastic tooling and other production purposes. Until now, the company name has been used to designate this epoxy line. The new trade name is needed to differentiate between the epoxy resin line and the cast and liquid phenolic resins produced by the firm. The products will be referred to as Marblette phenolic resins and Maraset epoxy resins.

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Hand Feeding . . .
8 hrs. @ 2000 pieces/hr. 16,000
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Cost per M pieces — 80¢

with Dickerman Feeds (83% press efficiency)
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Dickerman Press Feeds don't get tired. Dickerman Press Feeds produce — and keep on producing — 24 hours a day if necessary without let-down, human error. Downtime is negligible—even on million plus runs.

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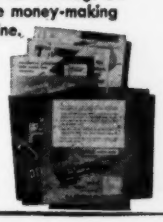

CIRCLE INFORM-A-GRAM KEY NO. 197

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Large Precision Machining
Done to your specifications
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21 Jig Borers
KIDDE PRECISION TOOL CORPORATION
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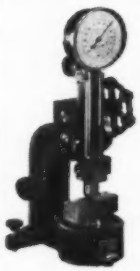

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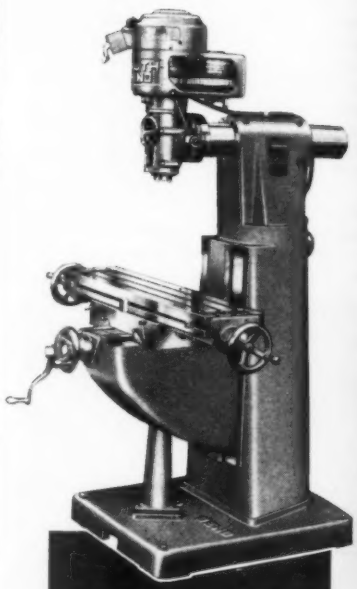

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VERTICAL

MILLING MACHINE

Exceptional versatility, accuracy and speed give this new milling machine the ability to keep machining costs low on a wide variety of work. Its simplicity of design provides ease of acessibility and set-up which simplify operation and job change-over. Ideal for toolroom, production and maintenance work. *Write for complete information.*

SPECIFICATIONS:
Table travel—20", or 30" Spindle to table—20", Spindle to column—20", Ram travel—15", Speeds—8.

SOUTH BEND LATHE
South Bend 22, Ind.
Lathes, Shaper, Milling Machine, Drill Presses, Grinders

CIRCLE INFORM-A-GRAM KEY NO. 1983

SCREW MACHINE PRODUCTS TO REACH $700-MILLION BY '65

A $700-million annual sales of screw machine products by 1965 is the prediction of the National Screw Machine Products Association.

With the industry's 1955 volume at $485-million, the predicted figure assumes even greater importance because the estimate is based in terms of 1953 dollars. If prices increase in their current ratio, reasons the Association, the estimated figure will probably top $800-million. The more than 280 member companies now produce approximately 65% of the total national production.

As part of the NSMPA's 10-year forecast, these additional predictions are made:

• There will be fewer screw machine products producers, but they will be larger in size. This is partly because of the current death rate among small companies and partly because screw machines are becoming more costly and demand more technology to operate.

To substantiate its thinking, the Association notes that during World War II a man could set up in business for approximately $5,000. Today it takes about $125,000 and the returns are slower and smaller.

• Modernization of existing equipment is the important goal for the industry, and it may be expected that the average age for screw machines by 1965 will be less than half of what it is today. Two years ago, for example, 56% of all screw machines were 10 years or older.

• Electronic inspection will take over from the human element. This is particularly inportant because inspection has always been a costly area for a screw machine products firm where rejects have averaged 2 to 3% of total sales. The Association also reports that there will be more automation and better material handling in these plants.

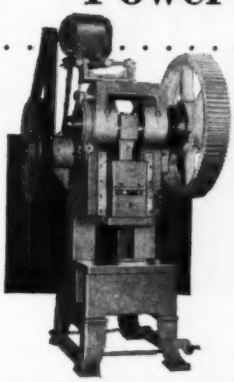
• Competition within the industry will grow keener as the weeding-out process continues. This will lead to more incentive and profit-sharing plans. There will be more in-plant training and a wider gap between skilled and unskilled pay rates, as years go on. Hourly wages and salaries of employees will increase 25%. And while there will not be an appreciable increase in executives' take home pay, the NSMPA thinks that executive bonuses, stock options and deferred payment plans will offset this.

• Leading firms 10 years from now won't be owned and operated by one or two men. Instead, there will be more paid general managers, more companies with their own engineering staffs, more college-educated businessmen and more self-sufficiency.

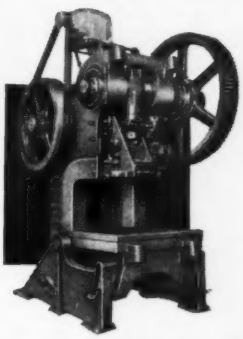
• Independent screw machine producers will better than hold their own in the next 10 years. The reasons are because the guaranteed annual wage will drive a lot of captive work into the open market and because the big producers will take a long look at their captive shops, not so much with an eye to wiping them out entirely, but to level production schedules with a minimum of overtime, placing the balance of requirements in the open market.

• The NSMPA concludes its 10-year forecast with the belief that many major screw machine product manufacturers will become semi-captive with perhaps 30 to 50% of their business coming from a few large customers.

"Get high production with Perkins Power Presses".



No. 9A Blanking Press
The best model for heavy duty blanking.



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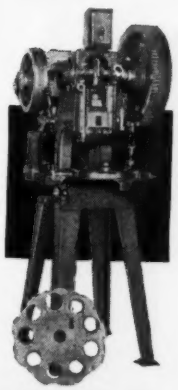
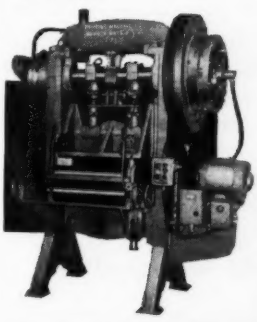
The general purpose Open Back Inclinable Press line featuring perfect safety in inclining without the use of a crane.

We specialize in furnishing presses built to customers' requirements. We would welcome your inquiries.



No. 2A Geared Press with dial feed. We make dial feed attachments in all sizes. Dial feeds increase production with perfect safety for the operator.



No. 3H Double Crank Press
With air clutch and brake, feed rolls, and latest improvements for higher speeds and increased production.

PERKINS
MACHINE CO. WARREN, MASS.
PRESS BUILDERS FOR OVER 50 YEARS

CIRCLE INFORM-A-GRAM KEY NO. 199

STANDARD LATHE AUTOMATED FOR SPECIALIZED JOB

An automotive manufacturer had the problem of removing a welding flash on a worm shaft assembly on a high production basis. The Seneca Falls Machine Company solved the problem by equipping their new model "LN" automatic lathe with certain standardized units to provide a specialized high production machine at substantial savings in initial cost and lead time.

The upper diagram in Figure 2 is a schematic view of the automatic work handling equipment. Welded parts are delivered to the lathe red hot directly from the welding machine by a conveyor, which joins the loading chute, and flow by gravity to the fixed stop, which is the loading position. On the completion of a finish turned part, the spindle stops, the hinged steady rest roll carrier is retracted, the collet chuck opens, and the finished piece is ejected from the collet by a spring loaded ejector rod. The part is then deposited on the unloader arms, which immediately swings the finished piece into the discharge chute and then returns to the receiving position.

At this point, an elevator assembly raises a rough piece over the loading chute stop into the loading cradle which remains in the raised position until the part is injected into the collet chuck by the pneumatically-operated plunger. The collet chuck closes immediately, the elevator assembly retracts, the hinged steady rest roll carrier automatically closes.

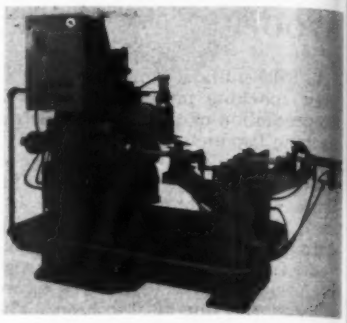


Fig. 1. Seneca Falls model "LN" automatic lathe designed with standardized units to provide a specialized high-production machine comprising a pedestal base, a combined headstock and work feed unit, a headstock turner slide, and a "packaged" automatic loader and ejector mechanism.

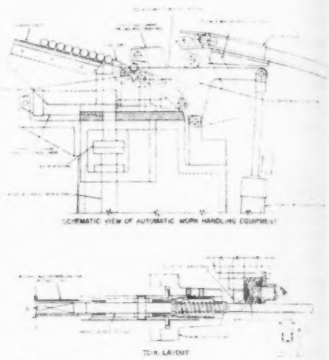
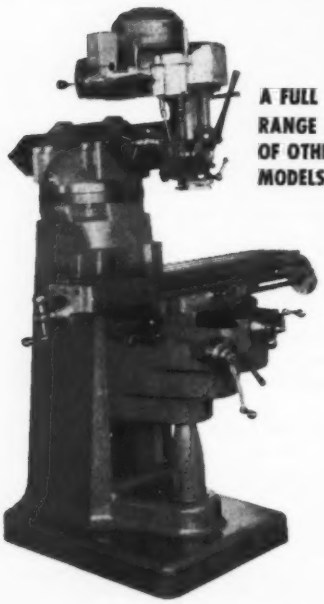


Fig. 2. Schematic view of automatic work handling equipment and tool layout.

Fig. 3. Work piece held in chuck and steady rest rolls and a second piece ready to be injected into the loading position.

LIKE A "45" AUTOMATIC
this NEW "45" INDEX MILL
has the "CALIBER" and "ACCURACY"
to do your
MILLING, DRILLING
and BORING JOBS
BETTER, FASTER AND
MORE ECONOMICALLY!



A FULL RANGE OF OTHER MODELS.

The big caliber derives from the sliding overarm—The unique square design of this overarm gives much more rigidity with its resultant greater accuracy—It provides extra range and capacity—More usable working space—More versatility in set-up—More power at the cutter. No adjustment required on overarm and head after use, and no need to re-indicate head after moving overarm. Speed range with 9 changes makes possible the use of high speed or carbide tipped cutters to the best advantage. Many other important features.

Write for Literature

INDEX MACHINE CO.
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CIRCLE INFORM-A-GRAM KEY NO. 200

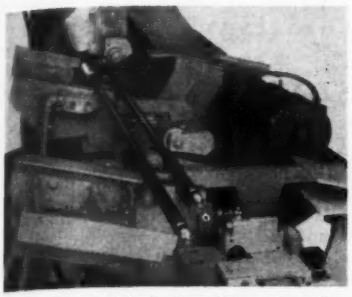


Fig. 4. Finished piece being ejected and a rough piece about to enter the loading cradle.

the headstock spindle clutch is engaged, the tools on the overhead slide advance to the cutting position, the flash is removed and burnished, after which the tools retract and a new cycle begins.

The lower diagram in Figure 2 shows the method of holding and driving the part in a collet chuck and also the location of the insert-type carbide tool used for removing the hot flash. A burnishing roll is also shown to smooth and evenly match the junction of the welded parts.

The entire loading, machining and unloading operations are entirely automatic; however, push button controls are installed for the manual operation of each movement. The loading cycle cannot get out of time since the automatic sequence is controlled by a system in which each movement is initiated by the completion of the preceding movement. A production of 275 pieces per hour is readily obtained with this equipment.

Automatic Lifter and Stacker Eases Material Handling

Two materials handling machines and a worker to check the cuttings now put through as much ¾" sheared plate at a large steel company's plant as used to be processed by 3 manual operators using a crane and a flat top stacker.

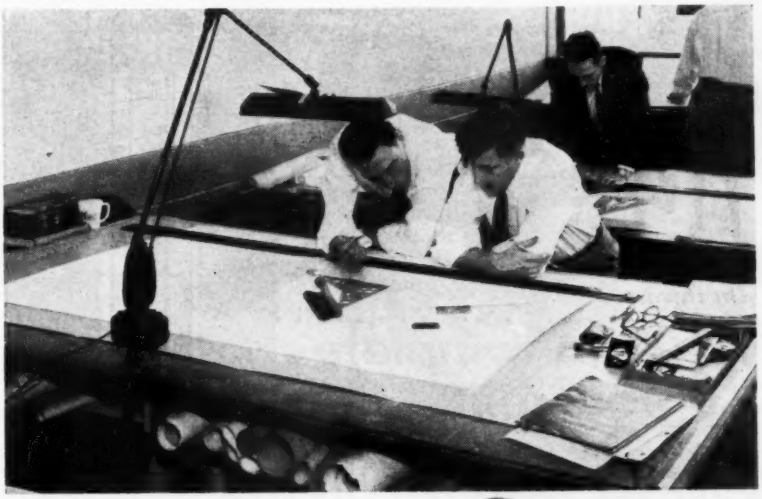
Since they were installed, the Fried Liftveyor and the Fried Stationary Stacker, as these materials handling machines are called, have, in addition, helped eliminate injuries caused by sharp-edged steel plates, falling trim cuts, moving shear blades, overhead cranes and the other hazards present when cuttings are handled manually.

Made by the Fried Steel Equipment Corp., 528 E. 119 St., New York 35, N. Y., these units work as follows:

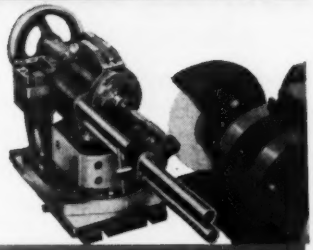
The Liftveyor—which in this case is an extra heavy duty unit—has a set of air-operated plungers that support the plate from beneath as it rests against the back gauge of the shear for cutting. As soon as it is cut, the plate is put on conveyor chains by supporting arms. Both these operations are entirely automatic.

The conveyor chains carry the plate from the shear bed to the stacker. When fully loaded, the stacking arms—also automatically—roll down to the end of the stacker, storing the cut plate neatly.

Among the advantages claimed for these automatic units are elimination of manpower behind the shear, tripling of shear capacity, reduction of shear down time caused by cutting accumulations which interfere with smooth handling operations, virtual elimination of injuries from sharp-edged cut steel plates, trim cuts, ragged burrs and other safety problems of a similar nature.



MONEY MAKING DECISION!



"GRIND WITH R-O FORM RELIEF". This legend appears on more and more cutting tool prints each year. A fast growing number of tool designers, tool process men and tool grinding room foremen are becoming aware of the potentials in better work and longer tool life that result from sharpening both standard and special cutters with the R-O.

Write for information and prices.

RO UNIVERSAL FORM RELIEVING FIXTURE

R-O Grinder

CIRCLE INFORM-A-GRAM KEY NO. 201

KEEP TRACK OF YOUR GAGES (AND YOUR CUSTOMERS')

by Albert L. Levitt
Bronx, New York

IN A CONTRACT SHOP EMPLOYING approximately 100 men, the task of maintaining a control over the shop's gages and those belonging to its customers can either lead to or alleviate any number of awkward situations. The shop is responsible for the gages and must be able to locate any gage and report on its condition at a moment's notice. It must keep a perpetual tabulation of gage use and inspection.

A comprehensive gage record system, such as the one to be described, helps keep this information up-to-date.

Considering the sources of the gages used in the shop (shop- and customer-owned), it is not practical to set up a numbering system which calls for marking each gage. Instead, a control system has been devised in which all of the gages in the shop are identified by classification, or type, size and class. The only gages that need marking are duplicates in any classification and size. These can be numbered progressively and recorded by classification, size and number. This facilitates the accurate recording of each gage's individual history.

First Steps in Gage Control

All gages enter the shop by way of the production control office, where they are inspected and recorded. A "Wheeldex' card is made up for each gage, listing all pertinent data including the inspection report and receiving date, and it is filed by classification and gage size.

Gages sent to the shop by a customer for a particular job are listed separately for cross reference.

When a gage is to be sent into the shop for use, production control issues a "shop tool card," a duplicate of the production control card, with the gage. The shop supervisor receiving the gage signs the production control card and thus accepts complete responsibility for the gage.

Gages are stored in cabinets in the shop area according to classification and size. The shop tool card is marked to describe the gage's location at all times.

Upon receiving a gage for shop use, shop personnel sign the shop tool card. Upon returning it to the supervisor, the operator supplies an estimate of how many parts he has gaged with it, and this information is recorded on the card.

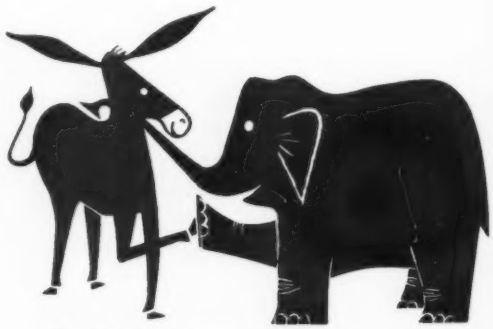
Interdepartmental gage "loans" are handled in much the same manner.

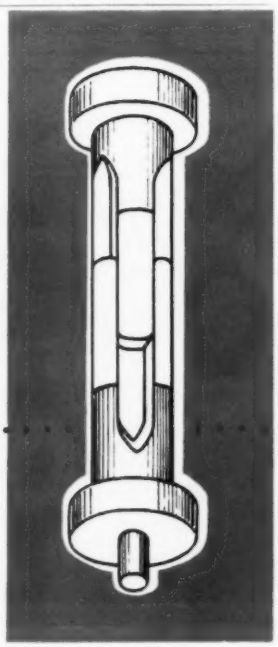
Regular Inspection

When the gage control card indicates that a sufficient number of parts have been gaged by any particular gage, the shop supervisor sends the gage to the inspection department. Here too the card is "signed in" by the inspector as part of the receiving procedure. The supervisor then files the tool card in a separate "out for inspection" file.

Identifying data from the tool card are copied from the shop card to the inspector's gage report. Inspection completed, the gage and its inspection report are returned to the shop supervisor. A carbon copy of the report may be filed by the inspector for his protection.

The shop supervisor, having the gage and its inspection record, then





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punch holes easier, faster, and accurately in SOFT or HARD, THICK or THIN materials. It's a trouble free operation because it provides positive alignment, closer clearances, cleaner burr-free holes. You get longer life because the punch is supported its entire length by the Intermeshing Sleeve.

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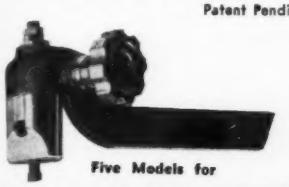
Monarch Precision
SHAPLANE
Radius Tools
Patent Pending



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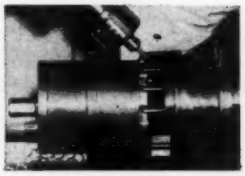
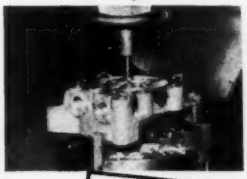
of their durability and long life lies in our method of grinding which produces a smooth, unbroken cutting edge. No saw-tooth edge to load-up and break-down.

See the display of Micro-Miniatures at your jobbers or write us for details.





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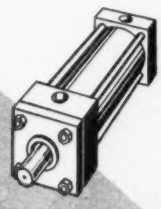

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NONROTATING AIR CYLINDERS

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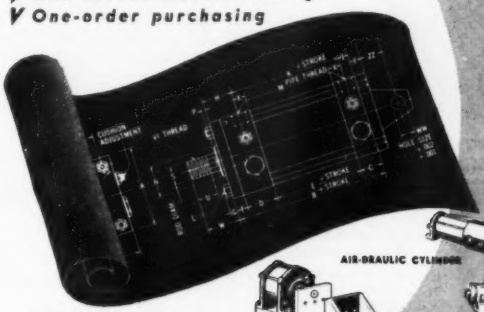

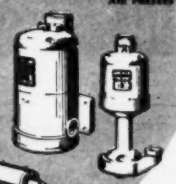

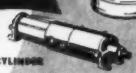

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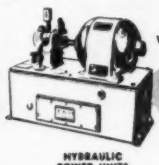

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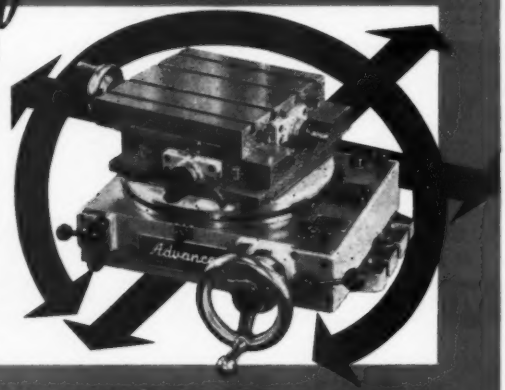
Permits fast, precise positioning of workpiece from ONE SET-UP. No unclamping and reclamping on your standard vertical mill equipped with ADVANCE Cross-Slide Rotary Table.



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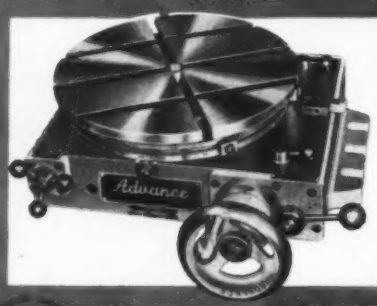

ADVANCE 15" ROTARY TABLE

This rugged, precise tool is designed for all types of work requiring rotational accuracy. Its maximum speed and precision, and minimum maintenance fills the need for a precision unit at a moderate price.

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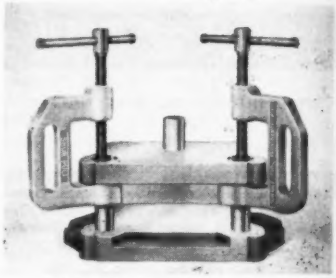

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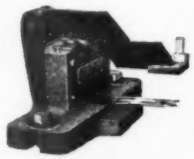

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CIRCLE INFORM-A-GRAM KEY NO. 2045

decides as to the gage's usefulness, accuracy and life expectancy for his purposes:

- Should it be scrap, rework, etc., the gage, inspection report and shop tool card are returned to the production control office.

Production control personnel indicate on their "Wheeldex" card that the gage has been returned. Then necessary steps may be originated to repair, rebuild or replace the gage, should it be required for future use.

- If the gage is in fair or poor condition but still useful, the shop supervisor notes the inspection information on his card. This information serves as a warning to all who may use the gage.

In such a case, the inspection report will be forwarded to the production control department and the report's information recorded on production control's card. This serves as sufficient warning and notice to investigate future gaging requirements, to replace the shop's stock if the gages are available, or to order a replacement gage.

- Gages that pass inspection are returned to the shop gage cabinet; the tool card is marked with the inspector's report; and the report is forwarded to production control, where the inspection data are recorded.

When a customer's gage is to be returned, the shop supervisor removes the gage's tool card and the gage and sends them to production control to be checked out.

Such systematic gage "bookkeeping" controls the use of gages in the shop and insures against loss and damage of both shop-owner and customer-owned gages.

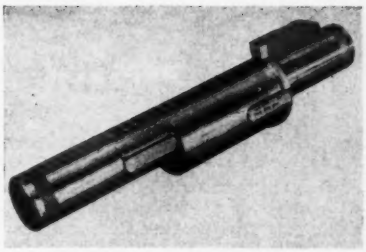
Adjustable Keyway Broach Cuts Dual-Size Splines

The convertible multi-purpose keyway broach—specially developed for the aircraft industry—is typical of the many adaptations possible with the Glenny Adjustable Broach.

The basic Glenny Broach, manufactured by East Shore Machine Products Co., 50 East 201st Street, Cleveland 23, Ohio, is widely used for precision keyway cutting and other internal slotting. It consists of a cylindrical housing with screw cap ends, accommodating an interchangeable blade. Simply turning the opposing caps moves an internal ramp to positively adjust the blade protrusion for successive cuts.

The convertible broach shown consists of a 1½" dia basic broach, fitted with a standard Glenny eccentric bushing with which it can be used in 2" dia holes as well.

Interchangeable blades were furnished in two cutting widths, for 0.390" and 0.520" keyways as required in this particular application. In addition, the broach body and bushing were fitted with removable index keys for cutting 90° spline slots. After the first slot is cut with keys removed, the appropriate 90° index key is inserted, and pilots through the cut slot to position the next slot at right angles.



Thus the tool will cut single keyways or 4-slot splines in either of two slot widths and in either of two dia holes, with an accuracy of 0.0005".

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CIRCLE INFORM-A-GRAM KEY NO. 205

The appointment of **S. E. Gewin** as district manager of the Chicago office of The Bristol Co. has been announced by **H. E. Beane,** vice president-sales. His successor as manager of the St. Louis office will be **Walter Messner.** Mr. Gewin has been with the firm's sales organization since 1937.

R. F. Myers is the new sales manager of the Machinery Manufacturing Division of The Motch & Merryweather Machinery Co. **Ray G. Knapp, Jr.** has become his assistant. **C. H. Priefer** will serve as district sales manager for the company's four branch offices. **David S. Baus** will take over as district manager for the territory including the Eastern seaboard, New York state and eastern Pennsylvania.

◆

The new director of sales for Micrometrical Mfg. Co. is **Frank W. Kabat.**

The Henry G. Thompson & Son Co. has announced the appointment of **H. W. Delano** as advertising and marketing manager. In his new position, he will have complete charge of the company's advertising, marketing and promotional programs. Packaging and other related functions will also be under his direction. Mr. Delano has been with Thompson for 15 years. **Joseph C. Farrell** will take over as sales engineer at the home office in New Haven, Conn. He will work on technical metal-cutting problems from the field, supervise an extensive metal cutting test program and conduct the distributor sales training program.

◆

Six men have been assigned to managerial positions by The Carpenter Steel Co. **Richard P. Evans** is the assistant to the vice president in charge of sales, responsible for executive contacts, with headquarters in New York City. **Robert P. Uhl** succeeds him as the New York district manager. **Charles E. Miller** has become branch manager of the Houston, Tex., area. **O. T. Thompson** has advanced to branch manager in the Detroit area. **J. C. Murray** is now assistant branch manager in the Pittsburgh area. The new assistant branch manager of the Cincinnati area is **Harry L. High, Jr.**

◆

Paul J. Chaney has been appointed commercial products sales manager of the Metals Processing Division of Curtiss-Wright Corp. He will be in charge of national sales to commercial markets of cast, forged and extruded products of the division. Before joining the firm, Mr. Chaney was associated with Oliver Co.

◆

A. G. Warren and **J. P. Nugent** are the new regional sales managers for Baker Brothers, Inc. Mr. Warren is in charge of sales in the New England and North Atlantic states with headquarters in Syracuse, N. Y. Mr. Nugent has taken over as regional sales manager in eastern Michigan and Windsor, Ontario, Canada. He has his offices in Dearborn, Mich.

◆

John W. Mason has been named manager of advertising and sales promotion for the Metallurgical Products Department of General Electric Co. He succeeds **C. E. St. Thomas,** who was transferred to the company's marketing services division in New York to handle internal and external communication activities. **A. F. Dobbrodt** has been named Pacific Northwest sales representative for the department. His headquarters will be in Seattle, Wash.

This Team Picks "T-P"
to Cut Tool Room Costs
Purchasing . . . Production . . . Inspection — each rely on Taft-Peirce Tool Room Specialties to do an important job for their company. Better construction, more attention to details like heat-treating mean much longer life, greater true value. T-P precision craftsmanship in grinding, assembly, and inspection assures unfailing accuracy on every set-up . . . a better part, or final product. And basic construction is so sound that many of these products are reground after extensive use for even longer life-value.
Remember, to get that extra cost-trimming value . . .
Specify these Taft-Peirce Tool Room Specialties
(Top row, left to right) Angle irons, large stocks of several styles and sizes; V-Blocks, cast iron and steel for milling, planing, grinding and inspection; Box Parallels, sides parallel to within .00025" in 6", square to within .0005" in 6". (middle row) Cast iron surface plate with universal square and cylindrical square; Duplex bench block; Sine angle plate; 5" and 10" Sine Blocks. (lower row) Taper test fixture; Granite surface plate with 5" Sine Bar; and Comperator-Square with Cylindrical Squares.
T P
TAKE IT TO TAFT-PEIRCE
THE TAFT-PEIRCE MANUFACTURING CO.
WOONSOCKET, R. I.
T-P Means TOP Precision
CIRCLE INFORM-A-GRAM KEY NO. 206

Another WESSON development eliminates grinding, makes tool changes quick and easy

New Precision Boring Tools Use Throw-Away Carbide Inserts

Micro-adjustable boring tools using "throw-away" carbide inserts are the latest in a series of developments pioneered by Wesson in recent months. Aside from eliminating grinding and speeding tool changing and setup, considerable improvement in performance and lower tool cost per piece are major advantages reported from the development.

On the Button

Precision adjustment for diameter of cut is positive and simple. It can be made without removing the tool from the machine since the new Wesson boring tools incorporate a calibrated screw adjustment. The circular dial has 25 graduations, each representing .001-inch. Thus each revolution of the screw is equal to moving the tip in or out .025-inch. Accuracy is assured since the head of the adjusting screw is always pulled up and locked positively against a locating face.

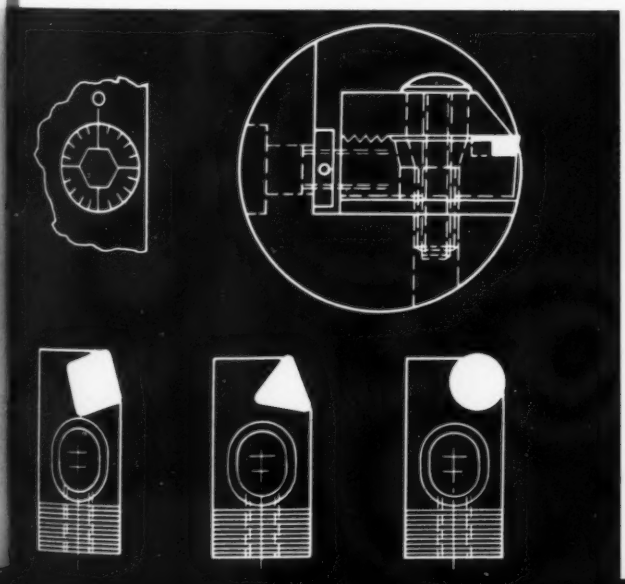
Among striking features is an adjustable built-in chip breaker that also serves as the clamp for the tip.

Versatility Too

Round, square or triangular inserts can be used with only minor parts changes. All parts of any one size of boring tool are identical except for the tip and the anvil-locator in which the tip is mounted.

The new tools are also suitable for internal (American Standard) threading operations using standard Wesson-metal 60° triangular inserts.

For more information on Wesson's micro-adjustable boring tools, write for Data Sheet 8156, or contact your Wesson tool engineer.

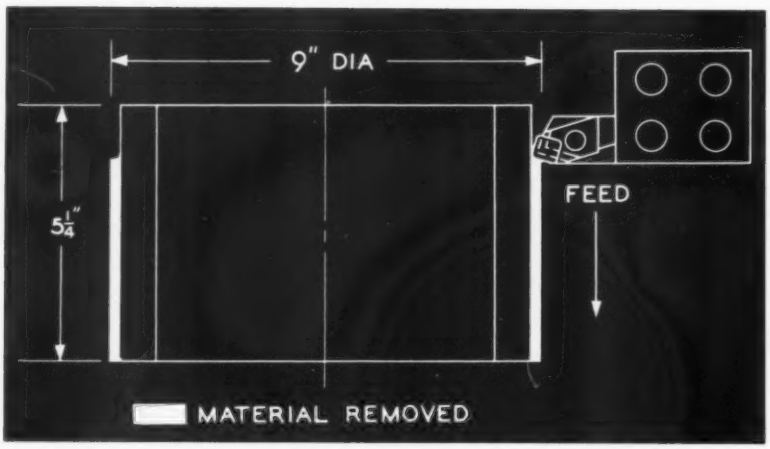


◀ *Calibrated-screw (upper left) enables precision adjustment in size of hole being bored to be made right in the machine. Note standardization of parts for interchangeability.*

Automation Boosts Demand for Special Tools

While automation tends to increase standardization of products, it works the other way when it comes to the tooling used in automated lines. So much so, in fact, that Wesson Multicut Company is erecting a new plant in Brighton, Michigan, just to take care of the skyrocketing demand for its special tools in automated industries. No standard tools will be produced at the new plant. The Multicut plant, shown in the architect's drawing, is the fourth Wesson expansion in the past two years. Previous expansion moves included the new Wesson Metal plant in Lexington, Kentucky, a new Wesson Research Center in Detroit and the new Wesson Cutting Tools, Ltd., plant in Toronto, Canada.

General Purpose Grade Beats Specials on Tough Job



Tough machining jobs don't necessarily call for special carbide grades. Often a general purpose grade will do an even better job. Here is a case in point. The job shown above, was turning the OD of a steel coupling that was unusually tough and scaly. The forgings (low-carbon chrome-moly-vanadium) also had considerable warpage.

Depth of cut, as a result, varied from .070 to .180 inches. This, with all that scale too, caused enough tool breakage to keep output down to around 24 pieces per tool (4 per grind) even though specialized grades were used.

The job was re-tooled with a Wesson Multicut holder using throw-away carbide insert of WESSONMETAL 26—a broad range general purpose steel cutting grade. Output jumped to 100 pieces per cutting edge (800 per insert) with no grinding required.

Tool cost dropped from 48 cents per piece to only 1.4 mills each. In addition, output doubled since WESSONMETAL 26 made it possible to step up both feed and speed on the Gisholt lathe in addition to reducing tool-change downtime.

Wesson tools Wesson carbide Wessonmetal

WESSON COMPANY DEPT. AD
1220 Woodward Heights Blvd., Detroit 20, Mich.
IN CANADA:
WESSON CUTTING TOOLS, LTD.
93 LEICESTER AVE., TORONTO 18, ONTARIO

COST CUTTING IDEAS PROVED IN OTHER SHOPS . . . Have you tried them?

When throw-away inserts are worn on all corners usable for turning, don't throw them away yet. In many operations, it is only the corner that really wears very much, leaving the rest of the insert as good as new. Switch it to a chamfering or facing operation.

• • •

When a part print comes from engineering with drill holes that have a high length to diameter ratio, see whether that ratio can't be reduced. If the ratio is cut in half you may be able to cut tool costs 80%. Tool costs go up much faster than depth of hole if diameter stays the same.

• • •

Don't assume that you've done a job on tool costs when you've cut the cost in half on a particular operation. Wesson engineers, time and again, have been able to help cut costs still further by on-the-job, in-the-shop engineering application.

Business Management Aids

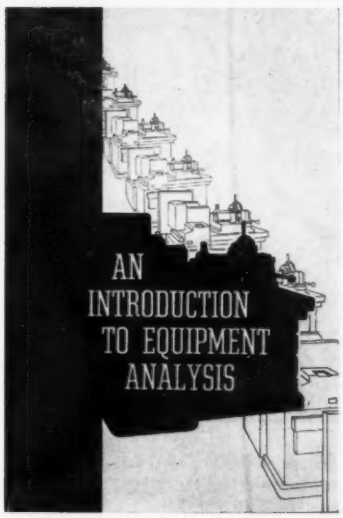
"The Door to Marketing Progress" discusses industrial advertising and stresses the need for more industrial advertising research. The booklet tells how the NIAA Industrial Advertising Research Institute functions. Also presented are brief resumes of the reports published, ones to be published, and the research projects under development by the Institute. In addition, the booklet tells how to subscribe to the Institute. For your copy, contact the Industrial Advertising Research Institute, 15 Chambers St., Princeton, N. J., or —
Circle Inform-A-Gram No. F1.

"Communication — Springboard to Success." In this booklet, the Time-Master dictating machine is described and illustrated. Listed and discussed are some of the machine's applications and places where it can be used. Also noted are several reasons why the Time-Master makes a job easier. For further details on the Time-Master dictating machine, see the booklet issued by Dictaphone Corp., 420 Lexington Ave., New York 17, or —
Circle Inform-A-Gram No. F2.

Pneumatic Tube Systems have been designed for transporting hot or cold samples to and from the laboratory and furnaces in steel mills, handling blue prints, etc. A catalog contains pictures, diagrams, layout and engineering drawings, charts and specifications on the Transitube systems. Also detailed are the uses and users and the types manufactured. Further information is in a catalog from The Grover Co., 25525 W. 8 Mile Rd., Detroit 19, or —
Circle Inform-A-Gram No. F3.

"Land of Promise" is a movie presenting the story of the St. Lawrence Seaway and its impact on the commerce and industry of Cleveland and northeast Ohio. The sound and color movie is 28 min long. Location, ports, labor, products, economic forces, transportation, foreign trade and plant sites are covered. For further information on the film, contact The Cleveland Electric Illuminating Co., Dept. TP, 75 Public Square, Cleveland 1.

Visual Control Panels have been designed to provide management with a new technique for operational control. The lightweight aluminum panels contain clear plastic tubes which can be individually removed or shifted. The design of the tube provides for many types of signalling. The panels are ideal for maintenance operations, production scheduling, machine and equipment loading, and issued tool control. They can also be used for manpower and material assignment, trainee instruction, efficiency ratings, and other functions to record progress. For complete information, contact Acme Visible Records, Inc., Crozet, Va., or —**Circle Inform-A-Gram No. F4.**



The Economics of Equipment Replacement are detailed in "An Introduction to Equipment Analysis." The current project of the Machinery and Allied Products Institute in this area is introduced. Included in the booklet is further development of the MAPI formula, improvement of its presentation, and generalization and expansion of the MAPI system to cover new-project investment. The MAPI system provides a guide to new project investment and facilitates the comparison of new-project and replacement proposals in the preparation of capital budgets. Copies of the booklet are provided by Machinery and Allied Products Institute, 1200-18th St., N.W., Washington 6, D. C. or — **Circle No. F5.**

"Quality and Quantity" points out how to write and use Auto-Typist personalized letters. Several promotion devices possible with the Auto-Typist are discussed including the carbon copy follow-up technique, the personal reply card and inquiry reply letters. For further information, obtain a copy of the booklet from The American Automatic Typewriter Co., 2323 N. Pulaski Rd., Chicago 39, or —
Circle Inform-A-Gram No. F6.

Teletype Equipment permits the instantaneous delivery of a printed message regardless of the distance it must travel. A booklet discusses the operation of the equipment, its features and keyboard and automatic (punched tape) transmission. Also detailed are the composite set, integrated data processing and message relaying through communication centers. This teletype equipment can be bought or leased. The booklet lists the companies to contact. Copies of "The ABC's of Teletype Equipment" can be obtained from Teletype Corp., 4100 Fullerton Ave., Chicago 39, or —
Circle Inform-A-Gram No. F7.

A Film-A-Record Electronic AO Reader which accommodates 16 mm or 35 mm microfilm has been introduced by Remington Rand, Div'n of Sperry Rand Corp., 315 - 4th Ave., New York 10. It features finger-tip control from high speed to slow creep and stop. Built-in interchangeable lenses permit an instant switch from 23:1 to 40:1 magnification.
Circle Inform-A-Gram No. F8.

The Florida Fact Kit is made up of a series of ten file-size leaflets on different aspects of Florida's economy. These leaflets deal with taxes and government, climate and health, education and culture, natural resources, and power (1955 and projected expansions). Also covered are markets (with a map of the state), transportation, research, and labor. One leaflet is devoted to a discussion of the industrial water supply in the state, complete with charts and tables. For your copy of the Florida Fact Kit, write to Florida Development Commission, Caldwell Bldg., Tallahassee, Fla., or —
Circle Inform-A-Gram No. F9.

AUTOMATICALLY ANGLE DRILLING EXHAUST MANIFOLDS

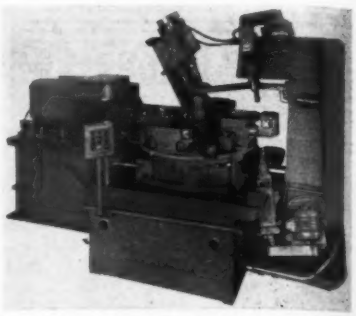
A special machine, known as the Angle-Matic, has been designed for processing exhaust manifolds for one of the new V-8 engines.

Michigan Drill Head Co., Detroit 34, Mich., developed this machine, building it from many standard components.

The Angle-Matic was designed to mill the locating pads, and drill and ream the angular heat tube holes in an exhaust manifold. At 100% efficiency, it will process 120 manifolds/hr and every operation is angular except the milling of the locating pads.

The fixturing of the machine is unique in that the stock is equalized around the cored openings, although no machined surfaces are available.

It is a 5-way angular and horizontal dial type machine, featuring a 4-station automatic index table and power clamping fixtures. The feed units consist of one standard horizontal hydro 5-column assembly and four standard 9" stroke self-contained quill units. It is built to J.I.C. hydraulic and electrical standards, and has automatic lubrication throughout.



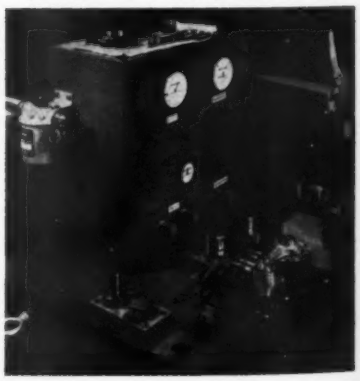
AIR GAGE MEASURES HOLE ALIGNMENT AND SQUARENESS

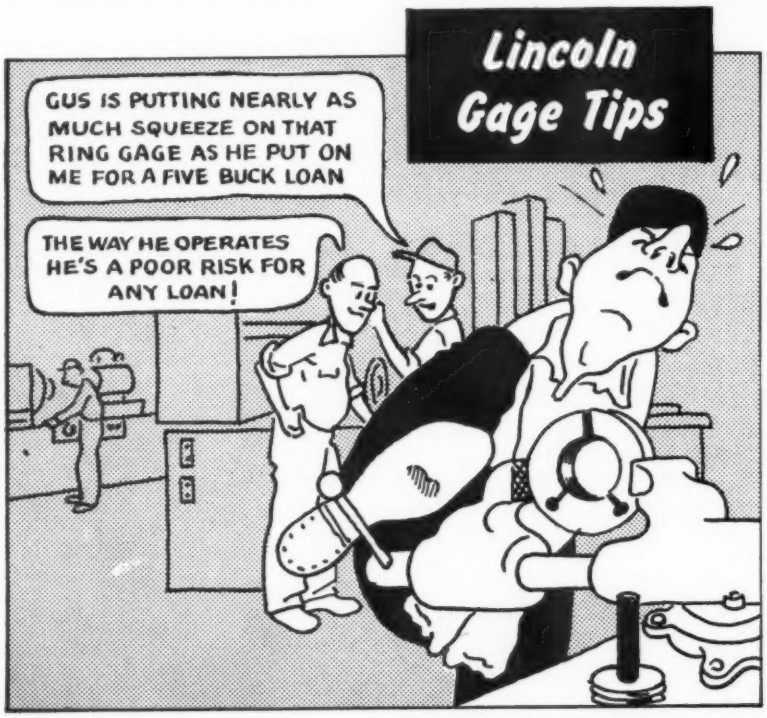
The air gage supplied by Federal Products Corp. to Carrier Corp. for checking three different sizes of connecting rods illustrates how gage design may be simplified and still adapted to broaden the use of such an instrument. The gage measures the parallelism in one plane of crankshaft and wrist-pin bores, and the squareness of the connecting-rod face to the crankshaft bore.

The first station is equipped with two sets of interchangeable air plugs. One set is for three sizes of crankshaft bores, the second for three sizes of wrist-pin bores. Crankshaft-bore plugs are interchangeable at the fixed position of the station. Plugs for the wrist-pin bore are mounted on a spring-loaded slide with three mounting positions, according to length of the connecting rod.

Each plug has two air jets, 0.400" apart, with one directly above the other on the outside of the plug (the side farthest from the other plug).

Fig. 1. First station gages connecting rod for bend by measuring the parallelism of crankshaft and wrist-pin bores. Crankshaft-bore plug is mounted in fixed position; wrist-pin-bore plug is one of the three positions on a spring-loaded slide.




Lincoln Gage Tips
GUS IS PUTTING NEARLY AS MUCH SQUEEZE ON THAT RING GAGE AS HE PUT ON ME FOR A FIVE BUCK LOAN
THE WAY HE OPERATES HE'S A POOR RISK FOR ANY LOAN!

NEVER USE FORCE TO ADJUST A RING GAGE. The adjusting screw is accurately aligned, permitting the ring gage to be adjusted to the correct size without distortion. Undue force could warp a ring gage, making it worthless.

Ring gages should always be set to a truncated set plug gage. We recommend ordering TRUNCATED SET PLUGS with each order of ring gages, particularly special rings.

A truncated set plug is the same as a full-form set plug except the crest of the thread is ground off for approximately one-half the length of the gaging surface. The full thread portion assures proper clearance and correct form at the ring's major diameter. The truncated portion controls the pitch diameter.

Write today, or teletype* for 20 page catalog. Fully illustrates our complete gage line and contains easily read thread standards.

*Teletype No. Roseville 834.

LINCOLN GAGE CO.

23902 Harper Ave., St. Clair Shores, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 210

The top jet of each plug is connected to one side of the air-gaging system, the bottom jet to the other side. A meter connected between the two sides of the system detects any unbalance, or differential, in air pressure between them. This differential represents variation from parallelism of the two bores.

With the proper air plugs in position, the gage is set with the master corresponding to the connecting rod to be measured. The center distance between plugs is adjusted until the master can slide freely on and off the

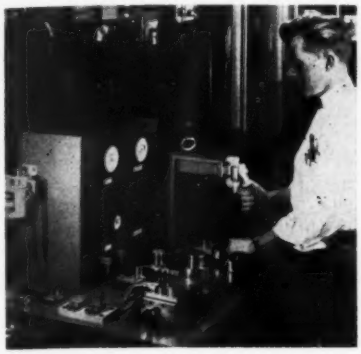


Fig. 2. Second station measures squareness of crankshaft bore to connecting-rod face. Rod is clamped firmly over air plug corresponding to bore size.

plugs. With the master held firmly in place, the air gage reading is taken. The master is flipped over, and a second reading taken. Zero (balanced) position is set in the middle of the two readings.

Placing the connecting rod to be gaged over the plugs quickly checks the parallelism of the holes. Workpiece tolerance for parallelism is 0.0015" over a 6" length; but since the spacing between top and bottom jets is only 0.400", this corresponds to a 0.0001" reading on the meter.

The second station checks the squareness of crankshaft bore to rod face. Three interchangeable air plugs handle the three different rod sizes. The gage is first set to zero with the correct master clamped on the plug. The master is removed, and the workpiece similarly clamped and rotated on the plug to show total variation from squareness.

A graduate program in the design, selection and operation of computers will begin this fall at Stevens Institute of Technology. The classes will be held two nights a week for three years. This program will fill the need in industry for personnel who can aid management in discovering where computing devices can be profitably employed and in choosing the machine best suited to a particular requirement.

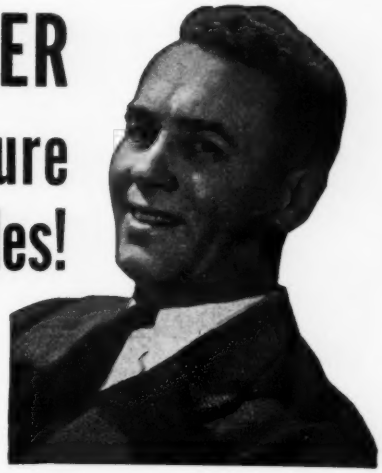
HUSER, BENETZ SERVE ON TRADE FAIR MISSONS

Two men prominent in the tool and die industry are voluntarily serving on U. S. Trade Missions in Europe.

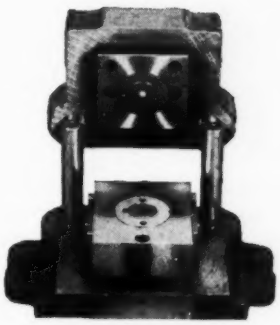
Joseph N. Huser, president of the National Tool & Die Manufacturers Association and president and general manager of B & H Specialty Co., Inc. of Indianapolis, served last month at the St. Erik's International Fair in Sweden and also at the German Industries Fair. John H. Benetz, president of Bridge Tool & Die Works, Inc. of Philadelphia and former officer of the NTDMA, served at the German trade fair in Berlin.

As members of the U. S. Trade Mission, they help staff U. S. Trade Information Centers at various International Trade Fairs, discussing mutual business problems and answering general inquiries on American products and merchandising with the foreign businessmen.

"HOVIS WASHER DIES have sure solved our troubles!



"You, too, should make washers the economical Hovis way. Save time, labor, materials and storage space"



Made in 5 sizes:
¾"- 1½"- 2½"- 4"- 6"
Write for Literature

NO NEED TO MAKE A NEW DIE FOR EVERY STAMPED PART

The modern method adopted by manufacturers nationally . . . These *Patented* Dies provide a Master Holder by which, upon simply and quickly removing and replacing Five, Small Interchangeable Parts, a new size washer may be produced . . . Special sets of parts available for use in these units . . . This method makes possible production of irregularly shaped pieces and shallow draws . . . Multi-Washer Dies designed and manufactured.

HOVIS SCREWLOCK COMPANY

8100 E. NINE MILE ROAD VAN DYKE, MICHIGAN
Phone: Slocum 7-4800 Suburb of Detroit

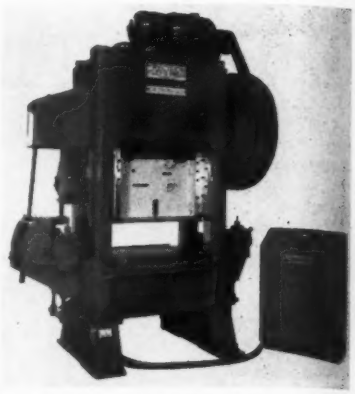
CIRCLE INFORM-A-GRAM KEY NO. 211

Ball-Bearing Equipped Presses Extend Die Life

Prolonged die life — up to four times the average — is made possible by the unique anti-friction ball-bearing raceway construction of the new 75-ton automatic Flexopress. The slide, with four pre-loaded ball-bearing raceways operating in hardened and ground steel inserts, maintains vertical accuracy within 0.0005" and parallelism between slide face and bed within 0.0015". This extreme accuracy prevents misalignment between punch and die, the major cause of die wear in conventional presses.

High speed operation — up to 370 strokes/min is made possible in the Flexopress because of low ram inertia. Contributing to this low inertia is the lightweight aluminum-alloy ram construction, the anti-friction bearings plus double air cylinder counterbalance.

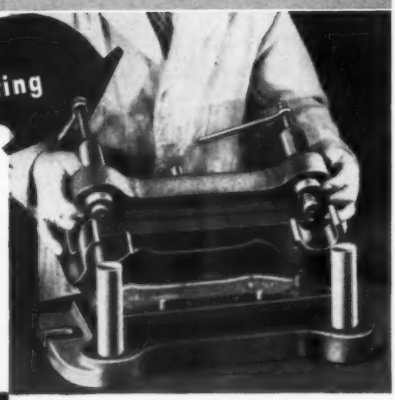
Large working capacity of the Flexopress, built by Precision Welder & Flexopress Corporation, Cincinnati, Ohio, is provided with a 15" side opening accommodating work up to 14" wide. Automatic feed is infinitely adjustable up to 8"/stroke. The slide face measures 32" wide and 18" deep with a 2" dia hole and a single knock-out.



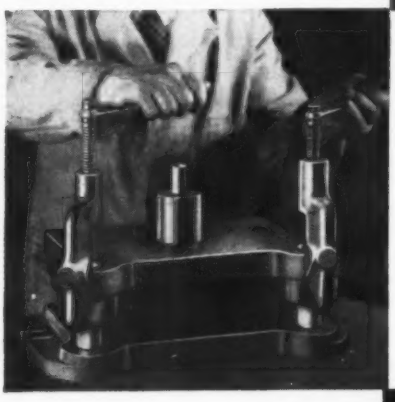
Hardened and ground double feed rolls have 360° cam lifters. The distance from the centerline of the rolls to the top of the bolster is adjustable from 4" to 5" and drive gear teeth are always on pitch center regardless of the material thickness. A scrap cutter is mounted integral with the feed rolls.

ACRO DIE SET PULLERS

...with Indexed Screw Wrenches for Uniform Lifting



Here's the die set puller for uniform, easy lifting of die sets. The principle of the Acro Die Set Puller is to remove the punch holder from the die shoe by a straight upward pull, whereby punch holder travels upward from die shoe axially, leaving freely from both leader pins simultaneously. This is accomplished only by use of the *indexed* screw wrenches which act as indicators, controlling the upward travel. This is an exclusive patented Acro feature, found only in Acro Die Set Pullers. They are available in three sizes and further descriptive material will be sent upon request.



OTHER ACRO PRODUCTS

Consist of modern drill rod racks, leader pin oilers, wing nuts and automatic lubricators. Write for additional information. Ask for bulletin TP-56P.

ACRO
METAL STAMPING CO.
340 E. RESERVOIR AVE.,
MILWAUKEE 12, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 212

Automatic Machine Assembles & Tests Cylinder Heads

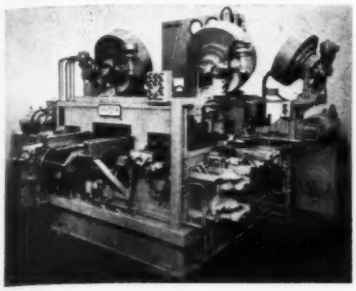
A new automatic assembly machine that applies sealer material and assembles three welch plugs in automotive engine cylinder heads, air tests the finished assemblies, and automatically rejects from the machine any heads that do not meet the test standards has been developed for an automobile builder.

This unique new 7 station, in-line transfer machine, built by Snyder Tool & Engineering Co., 3400 East Lafayette, Detroit 7, Michigan, is loaded from a conveyor. In automatic sequence, the machine applies sealing compound to three holes in the head, presses in three welch plugs, air tests the assembly for leaks, and rejects faulty heads from the line and unloads the head and plug assembly on a conveyor line.

Another unusual feature of the machine, which assembles 130 heads/hr at 80% efficiency, is that it makes right and left hand cylinder heads by alternately pressing plugs into opposite ends of the heads as they pass through the machine.

Welch plugs are fed to the machine from individual hopper feeds that deposit one plug at a time in front of hydraulic powered plungers

that press them into the heads. Maximum stroke switches on each plunger govern the machine cycle in such a manner that parts will not be transferred if any plug is not pressed in to depth.



Machine Operation

The parts are loaded into the machine from a conveyor at station one. Heads are transferred from station to station by a hydraulic powered walking beam type nest. In the second station, hydraulically operated fingers move one head to one side of the machine and the following one to the other side of the machine where sealing material is applied to the holes into which the welch plugs will be pressed. The heads are returned to the line and pass through idle station three.

At the fourth station the heads are again transferred to opposite sides of the transfer line where the three plugs are pressed in each head. After being returned to the line, the heads are transferred forward and air tested in station five. Rejects from the air test are removed to the side of the line at station six by hydraulically operated overhead transfer bars. Any repaired heads can be returned to the transfer line at this point by the same overhead transfer bars. The finish-tested assemblies are unloaded onto a conveyor at station 7.

Blast Descaling Improves Deep Drawing Qualities

Automatic blast descaling is now being used for cleaning low-carbon steel plates prior to deep drawing, reports Wheelabrator Corp. of Mishawaka, Ind. Scale-free steel improves die life, as does the matte finish left on the plate. This surface finish has superior lubricating qualities for deep drawing as compared with that of the conventionally used pickled and oiled stock.

Automatic blast descaling employs the airless abrasive blasting principle. Metallic abrasive is centrifugally thrown upon the plate as it passes through a cabinet on a conveyor.

'Stamps Out' 27 Years of Short Run Sales

Dayton Rogers Manufacturing Company of Minneapolis recently marked the 27th anniversary of national distribution of short run metal stampings. Previous to that, the activity was limited to the St. Paul-Minneapolis area.

The company's three modern plants employ 350 people and house the Small Lot Stamping Division, the Small Lot Plastic Division and the Hydromatic Die Cushion Division. Present weekly production schedules call for 90 to 125 new short run dies each week.

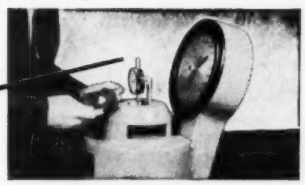
Dayton A. Rogers heads the firm as president and general manager. David H. Dulebohn is engineer in charge of production; Robert M. Gold, chief engineer; and A. M. Bakken, general sales manager.

Test — and be *sure* your material is . . .

You save metal and manpower by testing for drawing qualities and stretcher strain.

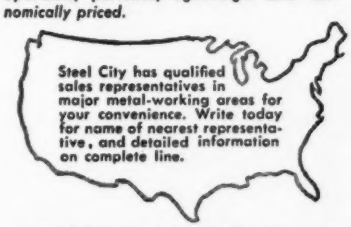
Tests thickness to ¼" for drawing ability . . . capacities up to 40,000 lbs. Simplified hydraulic controls. Widely used for steel and non-ferrous sheets and strips.

(CUP-TEST)



Quick yet non-destructive method to determine sheet metal suitable for forming parts . . . and need for roller levelling. Hand operated, portable, lightweight and economically priced.

(FLEX-TESTER)


Steel City has qualified sales representatives in major metal-working areas for your convenience. Write today for name of nearest representative, and detailed information on complete line.

Manufacturers of machines for testing physical properties of metals, including:

Steel City Testing Machines Inc.

Brinell Hardness · Ductility · Tensile · Compression · Transverse · Hydrostatic · Proving Instruments · Flex-Tester

8815 Lyndon Ave., Detroit 38, Mich. . . . and Special Testing Machines.

CIRCLE INFORM-A-GRAM KEY NO. 213

MACHINING OF PLASTICS BY NEW CRYOGENIC PROCESS

A new Cryogenic Process which has many important advantages in the production of high precision plastic parts has recently been announced.

This process, which incorporates the reduction of the plastic materials to very low temperatures before machining, enables the Standard Automation Products, 1738 Ridgeway Road, Havertown, Pennsylvania, to produce plastic machined parts, as illustrated, to closer tolerances than heretofore attainable. The reason for this lies in the high coefficient of linear thermal expansion of many plastics along with the wide temperature fluctuations occasioned by the frictions developed in high speed automatic machining. Although closer tolerances are possibly the outstanding advantage of the process, lowered costs of machined parts, better surface finishes, and the elimination of some secondary finishing operations, are also important advantages of the new technique.

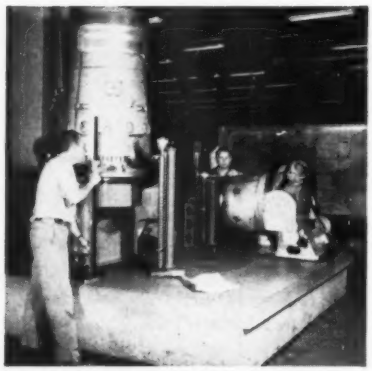
Using conventional Swiss automatic screw machines and other conventional machining equipment, plastics such as nylon, polyethylene, and tetrafluoroethylene in the form

of molded or extruded rods, bars, and tubes are processed and machined in ambient temperatures ranging from —20°F to —110°F. The actual temperatures used are dependent upon the type of plastic, the cross-section area of the piece being machined, the contours of the part, and the primary or secondary machining operation being performed. It is also important to control the moisture content of the atmosphere in order to minimize moisture condensation in the form of undesirable frost accumulation.

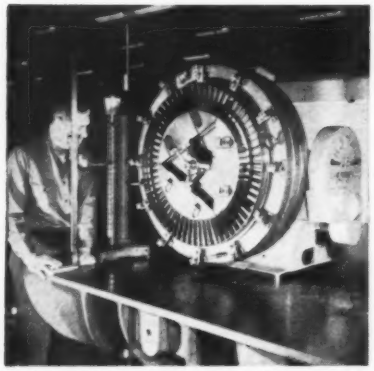
The new process is most useful in producing parts from plastics which have a high coefficient of thermal expansion. Many plastics which have only limited application in precision design because of fabrication difficulties can now be economically machined to extremely high standards.

ROTABS Beat Precision Inspection Costs...

This 24" ROTAB plus centering fixture cuts checking time for 11 dimensions on six vane segments from several hours to 5 minutes each.



Checking big jet engine assemblies is fast and simple on ROTABS (36" & 48"), eliminates costly fixtures made obsolete by engineering changes.



Seconds-of-arc precision allows quick, accurate inspection with low cost standard gages. Here 36" powered unit checks vane spacing.

For small parts inspection this 12" universal ROTAB minimizes setup and inspection time, does not require power for tilting and rotation.

For complete data on the optical precision readings you get with the ROTAB at the lowest cost, write:

MACHINE PRODUCTS CORP.

6771 East McNichols Road . Dept. C . Detroit 12, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 214

CONTOURING WITH SCREW MACHINE SLIDE TOOL

A new hydraulic-controlled internal contouring slide tool attachment, designed for fast, accurate internal contour boring of complex shapes as well as large diameter contour turning has recently been developed.

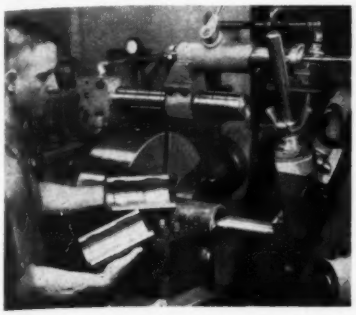
Engineered for application to 3-A or 4-A extra heavy-duty saddle type turret lathes, the new contouring slide tool mounts, at a 60° angle to the spindle centerline, on any face of the lathe's hexagon turret. The complete tool, with template holder and template attached, indexes with the turret, thus eliminating any interference with other tooling located on adjacent hex turret faces.

Using this new contouring attachment, built by The Warner & Swasey Company, Cleveland, Ohio, contours involving curves, tapers, radii and even square shoulders can be machined quickly and accurately, employing only simple, inexpensive tooling. In addition, low setup time enables both small and large lot production to be handled economically.

Actuation of the attachment's tracer slide is by means of a large, direct-acting hydraulic cylinder. The

long piston stroke of this cylinder provides an effective cutter travel of 4", thus permitting the machining of contours having up to an 8" dia variation.

Tracer slide response is obtained from a differential pressure, closed-circuit hydraulic system regulated by a precision built, microsensitive stylus-controlled valve. The stylus



utilizes a flexure-type pivot designed to eliminate wear and lost motion during operation.

During lathe operation, when the hex turret mounted slide tool is indexed into position, the bayonet lock on the overhead pilot bar allows the slide tool to be rapid-traversed into the lockup or longitudinal operating position. This rapid approach, with lockup of the tool slide and bayonet mechanism taking place automatically at the particular point selected for the start of the contour cut, minimizes handling time between adjacent tooling stations.

Since regular turret lathe work may be performed at any time on machines equipped with the new contouring slide tool attachment, the tool is ideal for use in shops not requiring full time tracing facilities.

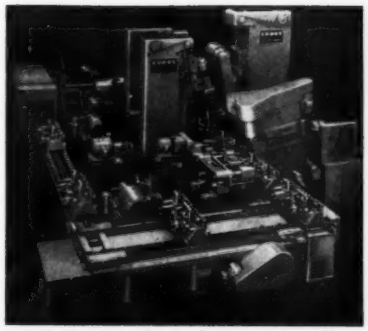
Six Station Machine Performs 51 Operations

A new transfer machine, which completely machines V-8 manifolds for one of the automobile producers, utilizes six stations to perform 51 operations — eight milling; 37 drilling, chamfering and spot facing; and six tapping.

Designed by The Cross Company, Detroit 7, Michigan, for fast and easy maintenance, the Transfer-matic was built on the Cross machine tool modularization principle, which means the construction of machine tools from standard parts, components and assemblies.

These units, or modular buildings blocks, facilitate part design changes and provide standard units for convertibility from one configuration to another.

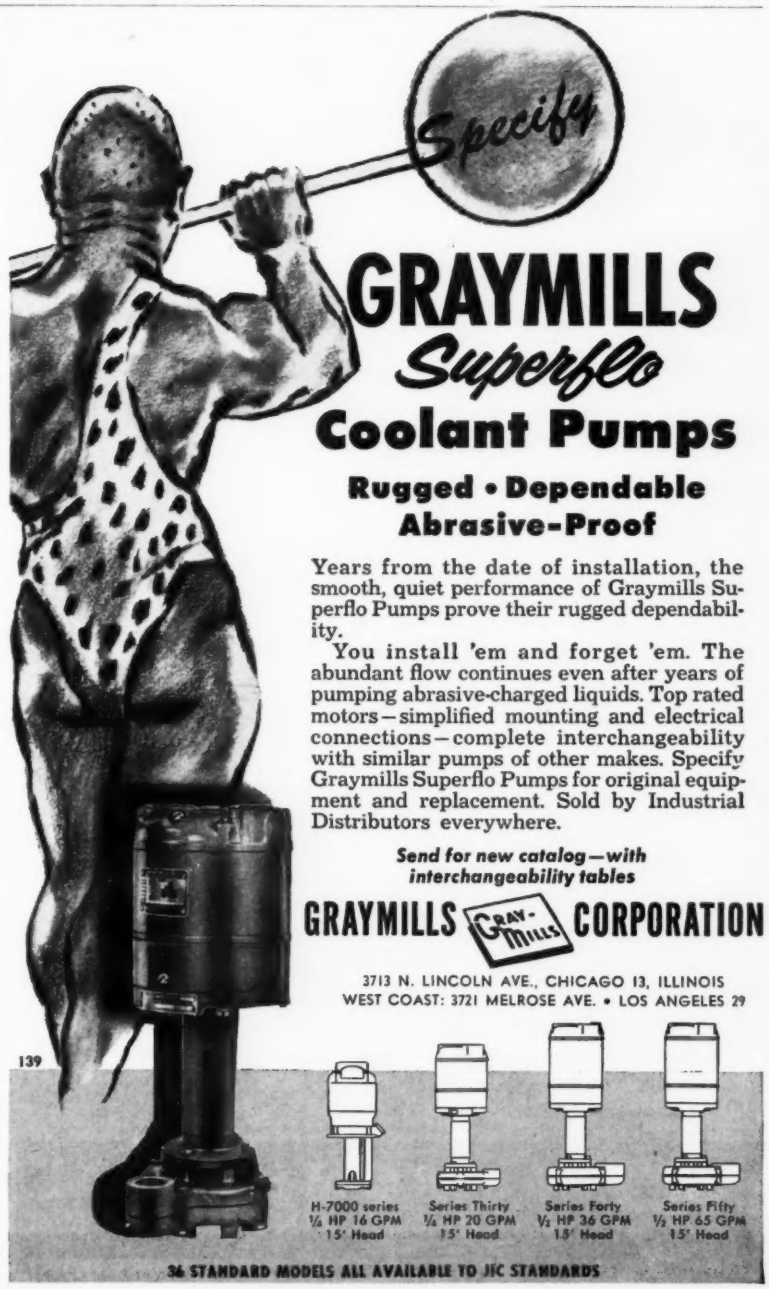
A major feature of the machine is the reduction of down time through



the incorporation of pre-set tooling. This eliminates machine adjustments and trial cuts, reduces tool breakage and grinding costs, minimizes scrappage of work and equalizes the operator's time.

Palletized work holding fixtures for holding one right hand and one left hand manifold are provided which are automatically operated by a hydraulic power wrench.

Other pluses are the Cross automatic transfer mechanism, hydraulic feed and rapid traverse for milling, drilling and boring; and individual lead screw feed for tapping. All Cross special machines include construction to JIC standards and hardened and ground ways.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CIRCLE INFORM-A-GRAM KEY NO. 215

PARTS CONTAINERS REDUCE MATERIAL HANDLING COSTS

Material handling, it has been said, is a manufacturing cost with no value, because this type of cost in no way contributes to the quality or usefulness of the finished end product. To reduce this valueless cost to a minimum, and eliminate it wherever possible, the speed and controlling of the flow of materials becomes an essential consideration for any competitive manufacturing operation.

Today's competitive situation demands: that materials be stored in minimum areas; that they do not have to be handled several times and recounted continually from primary operations to finished production operations; that audit materials and stock for parts in process be a quick simple easy matter, and visual wherever possible.

Parts should be packaged in standard quantities so that the counting operation is a one time process, balances being maintained by simple arithmetical deductions. Parts should be brought as close to fingertip reach of operators as possible with a minimum of muscular efforts.

To eliminate these valueless costs and reduce them to a minimum, the Alden Systems Company, Dept. 14, Westboro, Mass. has developed a Ready Count Parts Container. This container was designed to live with parts through the entire manufacturing process. For example — assuming that we have a punch press part that is later going into an assembly, the Alden container serves as a disposal tray from the punch press operation, it serves as a transport container for the parts as they are moved to the plating operation, and it again serves as a transport container for the parts going from the plating operation into stock. In the stock room it serves as a stock container, and when the parts are

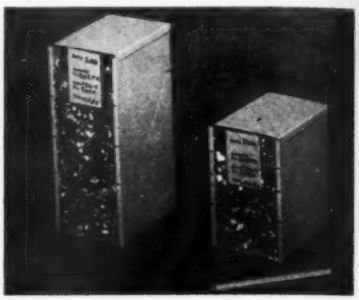
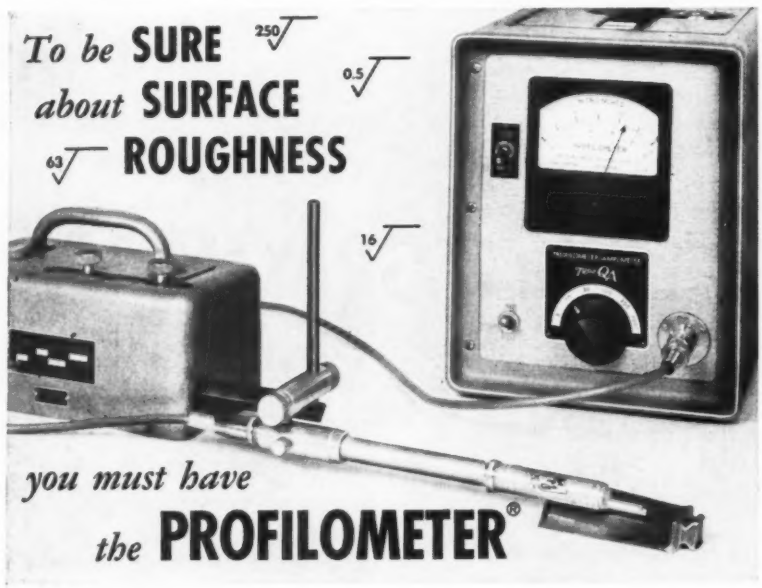


Fig. 1. Two sizes of Ready Count containers are shown in their normal vertical position. Transparent front panels retain the parts, but can be raised sufficiently for the parts to feed out from the bottom. Level marks make possible an approximate count of parts remaining in container.

to be moved to the assembly department it again serves as a transport container. When the job is set up on the assembly line it serves as the parts feed container at the point of operation, feeding parts to the fingertip of the operator. Again, as the operator completes her operation, she may dispose of her parts in a Ready Count container and it serves as a transport container to the next operation.

The Ready Count container is however, much more than a container. For example — when the parts come off the punch press and are disposed into the container, the first important information that we may need to know is how many pieces there are in the container. Now because the containers are standard sizes, we know that a full container of a given part is approximately so many units; for the production count this rough figure may be all that is needed. When the container arrives in stock a more accurate count may be needed. At this point the container with its contents can be weighed. Because the tare weight is



Here's why:

1 The Profilometer measures surface roughness height, in microinches (arithmetical or r.m.s. average). It lets you *select, specify* and *measure* roughness in *definite numerical terms.*

2 It is *accurate* and *dependable* — even below 10 microinches. Eliminates the errors and uncertainties of inspection by touch or sight. Cannot be set to give wrong readings.

3 It's a practical, portable "shop tool" — convenient and *simple to use.*

4 It's been *thoroughly proven* in thousands of production and inspection departments — *since 1936.*

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Profilometer is a registered trade-mark.

MMC MICROMETRICAL MANUFACTURING COMPANY

339 S. MAIN ST. ANN ARBOR, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 216

indicated on each container, it is a simple matter to determine precisely the quantity in the box. From this point on, it should not be necessary again to count the parts, because as parts are removed deductions can be made.

The container has a transparent front panel, therefore it is a simple matter to take quick visual audits in the stock room. If the box is half full, we know we have approximately so many units. Level lines make this easy.

Fig. 2. Parts are delivered to the operator's finger tips by means of container chutes.

The container is a rigid metal unit with a transparent sliding front panel. The panel is notched with a little catch lever on the side; so, if dropped or knocked over, the panel will not open and spill the parts over the floor or work top area. By releasing this lever, the panel can be raised to any height controlling the flow of materials from the container. The bottom of the container is pitched for easy delivery of materials right down to the last part. On the side of each container is a label with the tare weight indicated which enables easy counting of parts by weighing. Inventory tabs just slip over the top of the front panel listing the name, number, quantity, etc.

They are built on the vertical plane principle. They are narrow and tall, thus using the space above the work top area rather than sprawling out over it. In this way the maximum number of parts and materials can be placed in a minimum space.

Thus, it is possible to fan the Ready Counts around the actual point of process, bringing parts right down to finger tip reach of the operators. They are so dimensioned that the different sizes can be combined as required and fitted into a standard Alden requisition tray.

The requisition tray is a standard wooden container, which will hold 30 of the small containers and varying numbers of the other sizes. The requisition tray will fit into the standard Alden mobile library, or the permanent fixed library sections, for storage. Also by putting on the adapter cover, it converts quickly and easily into the giant Ready Count.

To take care of varying sizes of parts a series of chutes are used, which are made to complement the containers. The containers just slip onto the V shape on the back. The front of the chutes are of varying designs.

Fig. 3. Giant Ready Count delivers parts to point of operation, taking up minimum of work top area. It is made up by adding an adapter cover to a requisition tray.

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Ring Standardized Punches and Dies offer cost saving dependable performance for all of your perforating problems.

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CIRCLE INFORM-A-GRAM KEY NO. 217

MACHINING THE UNMACHINABLE

Machining materials harder than the forming tool used is accomplished by applying the principle of erosion by high frequency electric discharge.

A machine developed to perform this type of machining utilizes a soft master electrode having the shape and profile of the hole pattern to be produced. In its operation a series of sparks strike between the tip of the tool and the harder block, but at no time does the electrode come in contact with the workpiece. It removes the molecules of metal following the exact 3-dimensional shape and design of the electrode.

The erosion that takes place on the spark plug of an automobile engine is familiar to most car owners. The same principle is employed in this machine but the volume of sparks per minute is intensified and controlled.

The development and research work on this machine was carried out by Abaco Industries, Inc., 78-21 Queens Blvd., Elmhurst, L. I., New York. The machine is capable of removing 3 cu in of material per hour on a surface as large as 50 sq in or more, or as small as a few thousandths, giving a 10 micro-inch finish and holding tolerances of 0.0005".

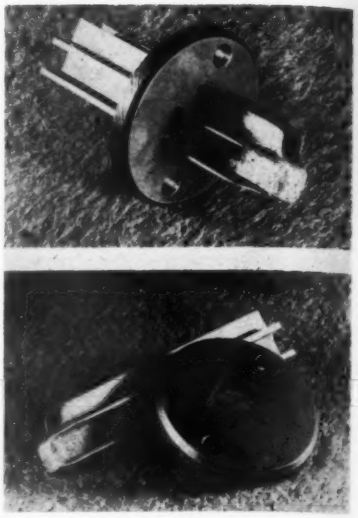

Fig. 1. A drawing die of high chrome nickel alloy, already heat treated, and the brass mandrel which serves to machine it. In upper view the electrode has been left in the steel plate. Lower left shows the finished die.

The machine is composed of a high frequency generator, a conventional machine which has the general appearance of a vertical jig borer, a battery of rectifiers for changing the current into pulsating DC, and a charging battery of capacitors for high energy storage.

The machine has four working speeds: roughing; semi-finishing; finishing; and micro finish; any one obtained by the turn of a dial. These

Fig. 2. Small electronic abrasive machine for sharpening carbide tipped tools with brass or cast iron wheel. Tools move across table for sharpening. (Guard was removed to give a clear view).

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We're proud of our position of leadership in the field of spindles for milling applications — a leadership which is the result of nearly five decades of experience in the spindle field. For our customers, it means a milling spindle for every purpose — a complete line of master-crafted super-precision units with which the designer can meet the requirements of any milling job!

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CIRCLE INFORM-A-GRAM KEY NO. 218

Fig. 3. This is a piece of flat ground stock, thickness 3/16", engraved and pierced by the two electrodes shown on the left. The engraving has a sand blasted effect as the whole operation was done on a roughing setting in 2 min.

in turn can be regulated from very low to very high intensity by turning another dial. The very sharp spark discharge of this 4½-kw machine is obtained by a special circuit.

The machining head is comprised of a non-rotating quill moved up and down by a servo motor. The working tool is under the constant action of this servo to give the machine a complete automation for the execution of high precision work. An electronic feeler controls a sensitive servo mechanism that moves the tool to hold a preset gap at all times and compensate for any tool erosion as it occurs.

Rate of discharge is maintained at a predetermined setting to give desired accuracy, finish and speed of machining. No heat is generated in the tool. The work is mounted in an oil pan which rests on an adjustable table. A coolant pump circulates dielectric fluid to immerse the workpiece while work is in progress and remove the micro chips as they are being eroded.

Carburetion Equipment for Industrial Trucks

Propane, a liquefied petroleum gas, is receiving renewed attention as an industrial truck fuel.

Equipment, designed for converting gasoline powered trucks to propane gas, has been developed by the Industrial Gastruck Engineering, 230 N. Michigan Ave., Chicago 1.

Propane has a 125-octane rating, thus making more power available with a decrease in fuel consumption. It has perfect combustion which gives better idling, a quieter engine, and cooler exhaust for better operation and improved health conditions due to elimination of obnoxious exhaust fumes.

Propane is stored in various sized cylinders and bulk storage tanks. In refueling a truck, it is simply a matter of changing gas cylinders which are purchased on a cylinder exchange basis. Operators of large truck fleets make a considerable savings on fuel costs by using bulk storage tanks having gas capacities of from 500 to 30,000 gallons.

Considering the possible savings in industrial truck operation cost by using propane as against gasoline, experience shows that a three truck fleet will save $63.07/mo, while a 30-truck fleet will save $883.50/mo. These savings are made up on fuel, oil, engine life, and maintenance.

The Cleveland Cap Screw Co., Cleveland, has added the micro sizes from No. 0 through No. 3 to its heat-treated alloy steel line of socket cap and set screws. In addition to cup points, cone, oval, half-dog and flat points are now available on the set screws. Other new products being marketed by the company include a line of socket head shoulder screws of heat-treated, alloy steel; tight-seal pressure plugs; precision-ground dowel pins and a line of stainless-steel socket cap screws and socket set screws.

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AA GAGE COMPANY

350 FAIR ST., Dept. C
DETROIT 20, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 219

INCHWORM MOTOR, A LINEAR ACTUATOR

The Inchworm motor is a linear actuator developed to fulfil the needs of industry for a powerful feed mechanism that is accurately controllable in the range of micro-inches.

It has been designed by the Airborne Instruments Laboratory, Inc., Mineola, N. Y., and is a logical successor to the lead screw in all mechanisms requiring micro-inch (.000,005" to .0001") dimensional control and has found its first large-scale application in the machine tool field, replacing the lead screws in centerless grinders producing precisely finished hydraulic components.

The name Inchworm has been applied to this actuator, not just as an unusual title, but rather as a description of operation — the Inchworm literally steps along (in micro-inch steps), expanding and contracting like its familiar green namesake. Employing a physical phenomenon called the magnetostrictive effect, the armature of the motor shrinks under the influence of an electro-magnetic field, snapping back to original size

when the magnetic field is de-energized. A pair of clamps cooperating with the armature convert the expansion and contraction undulations into forward or backward motion, reversing on demand without backlash.

Present day work tolerances require machine tools with cutting surfaces that can be positioned accurately with respect to the work holding system. To avoid vibration problems and make a very rigid system, the machine tool generally becomes very massive. The cutting tools are generally mounted on a heavy member which slides on accurate ways that are formed as part of the machine bed. These ways or slides exhibit a phenomenon known as stick-slip. Stick-slip is the characteristic of a larger force being required to start two members sliding with respect to each other than the force required to maintain a slow, steady velocity between the members. This phenomenon must be overcome or reduced to controllable limits before positioning the millionths-of-an-inch region can be accomplished.

The Inchworm actuator has brought the stick-slip problem under control to the extent that the minimum increment of slide motion in typical installations has been reduced by a factor of 15 through replacement of conventional feed mechanisms. These installations have consistently repeated to an accuracy of ±.000005" under machine load conditions requiring a break-loose force of 300 lbs and a sliding force of about 220 lbs.

The Inchworm motor produces a controlled increment of relative motion between its two moving parts. To provide relative motion between two bodies, each body is connected to one of the motor parts; either part can be stationary depending upon the particular application. A very rigid connection between the members is accomplished because no lead screws, split nuts, or bearings are in the path of force transmission.

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NEW ANOCUT ELECTROLYTIC GRINDING PROCESS
- CUTS DIAMOND WHEEL COSTS
- GRINDS FASTER
- SOON PAYS FOR ITSELF

NEW Hammond ELECTROLYTIC
OSCILLATING CARBIDE TOOL GRINDER

Write FOR CATALOG

The *New* Hammond Oscillating Carbide Tool Grinder was designed primarily for use with the Anocut Electrolytic Grinding Process. It can also be used for conventional grinding without the Electrolytic "Power Pack".

A controlled and precise method, the Electrolytic process removes stock electro-chemically. It is *not* to be confused with electro-spark or electro-arc methods. It reduces diamond wheel consumption 80 to 90%.

Outstanding feature is the precision, dynamically balanced, OSCILLATING spindle . . . with *variable* oscillations per minute and *variable* length of stroke. The operator no longer oscillates the tool . . . the wheel does the work, with greater speed, smoothness, accuracy, and less physical effort.

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CIRCLE INFORM-A-GRAM KEY NO. 220

In addition, since no lead screw is employed, there is a positive improvement in the system spring constant due to elimination of the torsional strain factor customarily introduced by the lead screw member. The resultant system is extremely rigid, yet reversible and free of backlash. It enjoys the benefits of anti-friction design and freedom from the wear inducing lost motions encountered in oscillatory or vibrating systems.

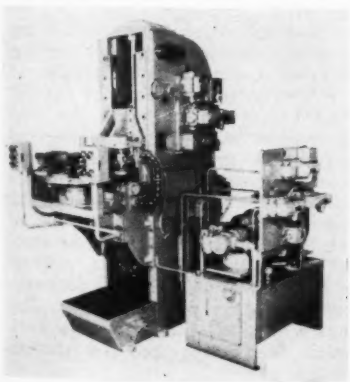
The Inchworm lends itself well to the automation trend in the machine tool field in that it will, through a simple converter, respond directly to gage signals. In this manner, machines may be made continuously responsive to tool variations as well as material hardness variations and the many other variables that enter into precise machine finishing.

The new linear actuator should have considerable impact on a large portion of the metalworking industry where precise fit requirements have, for many years, demanded selective mating of components to compensate for machining inaccuracies. The components can now be manufactured to the precise dimensions required. Elimination of the selective fit requirement opens the door to automatic assembly and the many economic advantages known therein to lie.

Broaching Machine Assembles and Burnishes

This new American T-6-24, 6-ton, 24"-stroke vertical pushdown broaching machine has been tooled to assemble bushings into cover parts and burnish inside of bushings in a continuous operation. With a 6.0 sec cycle, and based on 100% efficiency, 400 complete parts/hr can be produced.

The machine, built by American Broach and Machine Co., Ann Arbor, Michigan, represents an excellent example of the adaptability of the Type-T 3-Way broaching machines to push, pull, or surface broaching applications.



The T-6-24 shown is completely electrically controlled and hydraulically operated from a self-contained pump and tank unit. Tooling consists of: a 2-station push head; special dial-type index unit for carrying the cover parts through the separate operations; magazine and transfer slide for feeding bushings; and magazine and return for burnish balls.

The machine cycles as follows: Cover parts are loaded, either automatically or manually, at front of table; table indexes clockwise to assembly station where bushings are fed onto the part; machine ram moves down to press fit bushing into the cover part and returns to position; table indexes the completed assembly to burnishing position; and burnishing ball is forced through bushing simultaneously with new assembly operation at the first station.

TREET-ALL
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HEVI DUTY
Multi Purpose
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TOOL ROOM AND
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With a maximum temperature of 1850° F., the TREET-ALL can easily handle your scale free hardening, carburizing, dry cyaniding and silver brazing.

The alloy muffle and gasketed door form a tight seal which simplifies atmosphere control. The furnace, quench tank, cabinet and controls form a compact, completely wired unit.

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DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS
MILWAUKEE 1, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 221

Foster H. Pettay

M. J. Hoke

Paul T. Koenig

OHIO CRANKSHAFT NAMES NEW TOP MANAGEMENT

Foster H. Pettay has been elected president of the Ohio Crankshaft Company, manufacturer of diesel engine crankshafts and pioneers in the field of induction heating. Mr. Pettay succeeds the late C. H. Kimmel.

M. J. Hoke is new senior vice president and general manager and Paul T. Koenig, secretary and treasurer, according to Board Chairman W. C. Dunn.

The company's third president since it was founded in 1920 by Mr. Dunn and F. S. Denneen, Mr. Pettay has served in a number of top executive positions there. He joined the firm in 1941 as assistant secretary, was made a director in '50, vice president in '52, secretary and treasurer in '53, and senior vice president in '55.

Mr. Hoke was formerly vice president and general manager of the Camshaft and Crankshaft Division. Before joining the firm in 1945 as a development engineer, he had wide experience in engineering with Consolidated Aircraft, the Electromotive Division of General Motors and The Cincinnati Milling Machine Company.

Secretary-Treasurer Koenig joined Ohio Crankshaft in 1941 as an accountant. During his 15-year tenure, he had been office manager, assistant controller and controller.

NEW HELP FOR DIE MAKERS

A new technique in die making at the New Haven plant of The A. C. Gilbert Company, manufacturer of American Flyer Trains, Erector Sets and other electrical items and metal toys, which brings into use a Hamilton Die Part Portelvator for die holding, fitting, and separating during the critical die finishing operation has resulted in major savings of time and significant increase in efficiency.

Prior to the purchase of the Die Part Portelvator Gilbert, like most companies doing similar work, used a hydraulic press to "pull a pattern" from which to check the fit of punch and die. This was a time-consuming job which included positioning of the punch and die in the press, careful stamping of the pattern, removal of the punch and die, and painstaking separation with pry bars. The punch was then carried to a work bench, filed as required and returned to the hydraulic press for another

WHEN YOU'RE DEALING WITH PRECISION IN MILLIONTHS . . . DEPEND ON

FONDA

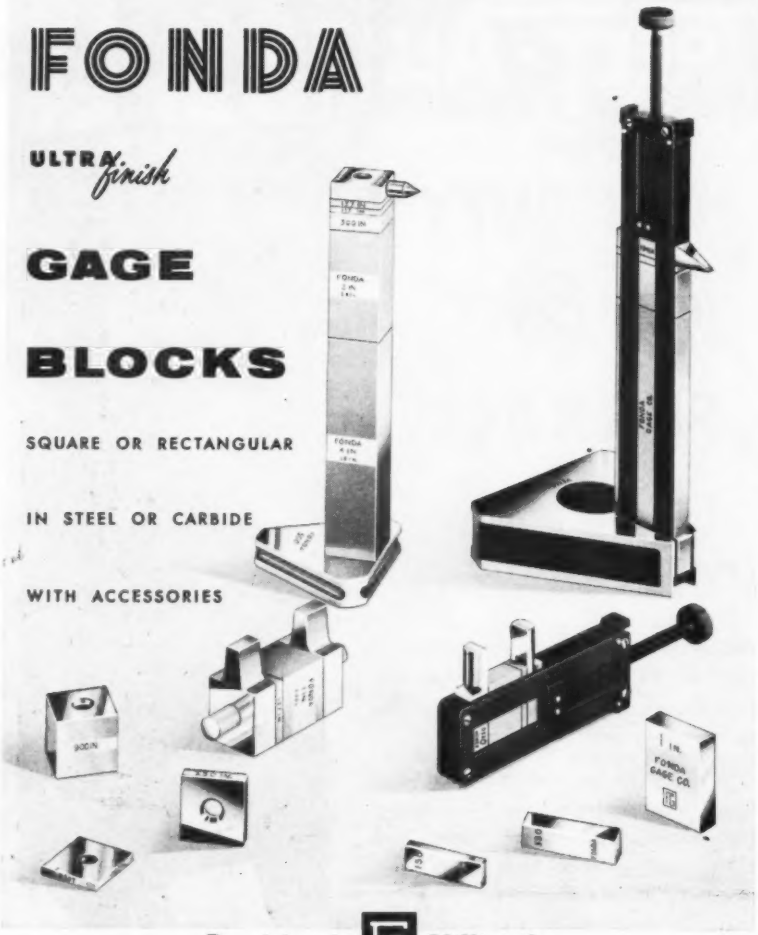
ULTRA *finish*

GAGE BLOCKS

SQUARE OR RECTANGULAR

IN STEEL OR CARBIDE

WITH ACCESSORIES



Precision in FG *Millionths*

When the order calls for pinpoint accuracy, there can be *no* margin for error! That's why FONDA *Ultra-Finish* gage blocks . . . painstakingly developed and precision engineered . . . guarantee *you* gaging closest to perfection. *Compare!* You'll find FONDA gage blocks and accessories, both price and tolerance-wise, are the *finest* your money can buy! Write *now* for literature and the name of our representative in your area.

D. C. FONDA GAGE CO.

200 HENRY ST., BOX 1050, STAMFORD, CONN.

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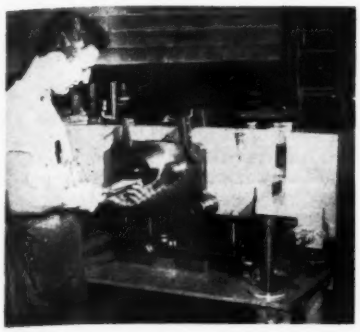


pattern, to be followed by another, and yet another, until the punch and die set passed its final critical inspection. During much of this work, two men were required and the hydraulic press was "down" for production work.

The Portelvator which is now used for this work is of standard construction except for the top plate which is designed special for the work and features an integral tilting mechanism as shown by the illustration.

Following the new technique, the die is bolted to the Portelvator middle plate and the punch is positioned on the shank. The punch is then clamped to the Portelvator top plate (at zero position) and with hand crank pressure a pattern is taken. The punch and die are then separated by means of the same hand crank mechanism.

Next, transferring the hand crank to the upper position, the special top plate is rotated to a position convenient for work and the necessary filing done.

Subsequent patterns are made without any re-positioning of the die and punch.

In this way Gilbert has reduced a difficult two-man job to a convenient one-man job, has freed a hydraulic press for production work, has saved time and increased efficiency in die making. Further, the Portelvator can be wheeled to any place in the shop which offers the best light and the best facilities for the job. At Gilbert one such Portelvator is considered sufficient for the entire tool and die department.

The Order Blank On Page 64 Is For Your Convenience In Ordering Reprints And Books.

MODERN TOOL IS JONES & LAMSON'S LATEST ACQUISITION

The physical inventory, work in progress, trade names, design and customer good will of Modern Tool Works, Rochester, N. Y., have been acquired by the Jones & Lamson Machine Company, Springfield, Vt.

Plans now call for integrating the new line, consisting of collapsible taps and chasers, solid adjustable taps and chasers, the Modern Magic Chuck and the Modern Stud Setter, with J & L's existing line of tools in the Thread Tool Division. This should blend well, the company feels, with the existing manufacturing, engineering and marketing facilities of that division.

Chasers for the Modern die heads will continue to be manufactured for those customers who have these die heads.

The Modern Tool Works was founded shortly before World War I, purchased by the Consolidated Machine Tool Corp. in the late 20s, and three years ago became a division of Farrel-Birmingham Co., Inc. of Ansonia, Conn.

It's New! It's Different!

the Burns Style

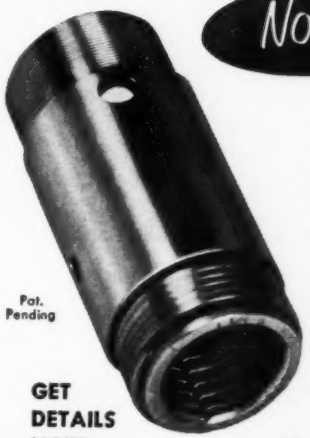
TAPER LOCK PUSHER

(NOW Featured by Allen)

No Friction

No Scratch

No Wear



Pat. Pending

GET DETAILS NOW

Many other important features

Burns style Taper Pushers wear in and do not wear out. The taper lock principle enables the gripping surface to expand and contract automatically within a different range which fits both hot rolled stock and cold finished stock without change of pusher. . . . The pusher locks positively in forward direction and opens freely in opposite direction . . . No friction or scratch on return of pusher. Bar cannot bounce back from the stock stop. Eliminates short pieces that waste material and machine time . . . Taper lock holds regardless of length . . . Bars up to 20 feet and longer used with ease and without strain . . . The automatic adjustment of the taper lock increases the pusher life many times over that of the ordinary pusher.

will pay for themselves in 3-weeks time through tangible savings of money

Desirable territories open for representation, inquire now

ALLEN COLLET MFG. CO., INC.

17720 CLARANN AVE. • MELVINDALE, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 223

ARE YOU GETTING THE MOST OUT OF YOUR PUNCH PRESSES?

by E. V. Weyler
Executive Vice-President
WALSH PRESS & DIE COMPANY
Chicago, Illinois

ONE OF THE MOST VERSATILE machine tools in any shop is the open back inclinable punch press.

A thoughtful review of the facilities used in your own operations with an eye to where an O.B.I. might fit in and whether you are getting full use from your present machine will pay dividends in lower unit costs.

Adaptable to more than 75% of all stamping operations, the O.B.I. press can be used with all materials, can perform a multiplicity of operations, including die try-outs. It offers low initial cost, high productivity, and can be easily adapted to meet constantly changing production requirements. In addition, where high production and a long run are called for, the O.B.I. can be fitted with a number of accessories which ease maintenance, improve operation, and lower cost per unit.

Of course, best results from any punch press require that it be of adequate tonnage and that it be fitted with dies designed so that the material being worked will flow properly.

With proper dies and proper tonnage selection, our users have reported that O.B.I. presses are suitable for almost all stamping operations such as, blanking, forming, drawing, perforating, embossing, coining, notching, and shearing.

Users engaged in general manufacture and jobbing operations report excellent results where they have used their O.B.I. presses not only for progressive, compound, or draw operations, but also for secondary operations.

Use of the O.B.I. press with progressive dies assures high production at low production cost and is a system generally used for complicated parts where it is necessary to have several operations incorporated in one die.

Progressive dies actually convert a standard machine into a specialized unit capable of producing very intricate parts.

Whether the press is fitted for single station or multiple station dies, the inclinable feature is highly desirable.

Use of an O.B.I. punch press instead of a screw press for die try-outs in the toolroom not only determines that the blank is properly developed, but also assures that the die will work satisfactorily when used in high speed punch presses. When a screw press is used to try out dies almost any material will work, since the press speed may be only one or two strokes a minute. When the same material is used in a punch press at 100 strokes per minute, the material will quite often not flow the same. Use of an O.B.I. for try-outs as well as in production runs cuts equipment costs and saves space.

Tilting the punch press with the inclining mechanism built into the machine allows the workpieces to easily fall out of the back of the press. Where air blow-out devices are used to facilitate removal of heavier parts and clean the die out at the same time, inclining the press makes operation of the air device easier and more certain.

Many of our customers who often change the speed of their presses report great savings have resulted from equipping their presses with variable drive motors. This feature allows

Buck AJUST-TRU CHUCKS

"Hold O.D. and I.D. within .001" day in and day out."

Buck Ajust-Tru chucks are ideal for precision grinding. Most recent report is from Mr. Chester Nelson, Supt. Press & Machine Div., J. I. Case Company, Bettendorf, Iowa. He writes —

"The part has been O.D. ground on a Centerless Grinder first, then the I.D. is ground by being held in the six (6) jaw Buck Chuck. The accuracy of the Buck Chuck is used to its fullest extent since the O.D. and I.D. have to be concentric within .001" total indicator runout. This tolerance is being held constantly day in and day out."

You, too, can handle precision grinding *faster* and *at less cost* with Buck Ajust-Tru chucks. Takes but a moment to send for literature — write today.

Do you use Power Chucks?
Ask for information about the new Buck standard and Compensating chucks — up to 12".

BUCK TOOL COMPANY
1018 SCHIPPERS LANE • KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 224

the speed to be changed while in operation and eliminates the downtime and manpower previously required to change pulleys each time a different speed is desired.

In many cases a production increase as high as 100% is reported where a variable speed drive is used in conjunction with the mechanical high speed on and off brake. An air blow-out attachment which can be adjusted for timing and force of blast is also necessary for these extremely rapid operations.

An extra which is almost a necessity where variable speed motors are installed is a fully automatic lubrication system of all bearings. Such a system eliminates "operator error", cuts the time spent in hand lubrication of the press to nothing, and reduces bearing wear since all bearings operate continually in a film of oil.

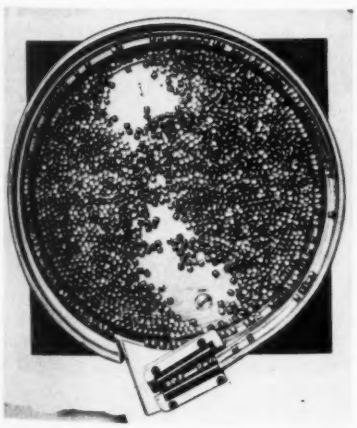
Automatic feeds are available from a number of manufacturers and where this is desired on a newly ordered press, the type of feed to be used should be specified. The press can then be adapted for this feed by the manufacturer before shipment.

If your shop review indicates that there should be some changes in your production setup and your use of punch presses, you will find established press manufacturers are always ready to discuss these changes with you and make recommendations based on their long experience.

New Table Model Set Screw System Now Available

The Setko hopper-fed system for applying headless set screws is now produced in a bench or table model.

The system gives most efficient results when used with the specially-designed Setko hopper-fed headless set screws. Special set screws are made in a wide variety of points and in three styles: hexagon and fluted socket, slabbed and slotted, including self-tapping and self-locking types.



In operation, the screws are automatically channeled from a vibrating hopper down a guide tube directly to the work, right side up and properly positioned for driving. Both bench and floor equipment can be readily automated with this hopper-fed headless set screw system, as an efficient method of cutting costs and improving product quality.

The system requires only 1/5th to 1/10th the time of former methods. It automatically inspects diameter and rejects misfits, working equally well with all metals and with plastics. Types of machines and equipment with which the mechanism can be used include drill presses, vertical tapping machines and vertical and horizontal rotary table machines.

Complete details on both bench and floor adaptations of the Setko hopper-fed headless set screw system are supplied by Set Screw & Mfg. Co., Bartlett, Ill., or —

Circle Inform-A-Gram No. D1.

Convenient as ordering from your corner grocer!

TRADE Verson MARK

PRESS BRAKES FROM STOCK

It's simple, quick and convenient. There are no involved proposals, no long waits . . . Verson standard press brakes are *immediately* available from stock.

Prices are the same too! Because of the large demand and high volume of sales you can still get a Verson Model 16-48, 16 ga. x 48″ capacity, for $1,600* and a Model 1062, 16 ga. x 78″ capacity, for $2,630*. All with that Verson quality, designed and built for long life and top performance.

Write for specifications, then just place your order.

New, Improved, Fully Enclosed VERSON SHEET FLOATERS

Easiest, most economical way to separate steel sheets and blanks. Available in 3 models, each with 7 sizes. Write for descriptive literature and prices.

**FOB Chicago, less dies.*

A Verson Press for every job from 60 tons up.

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VERSON ALLSTEEL PRESS CO.

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MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES
TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES

CIRCLE INFORM-A-GRAM KEY NO. 225

SHOP AIDS

This Tool Steel Selector provides a method for quickly selecting the right tool steel for a specific job. Around the outer edge of the selector are listed the six major classes of tool steel application — impact and cutting tools, hot and cold metal forming, die casting and plastic molding. The major class and its sub-group are selected to find the grade and then its characteristics such as type, depth of hardening, machinability and typical heat treatment (harden, quench, temper and Rockwell "C") are noted. Copies of the Tool Steel Selector can be obtained from Crucible Steel Co. of America, Oliver Bldg., Pittsburgh 30, or —**Circle Inform-A-Gram No. C1.**

A Crane Operation and Hitching Manual issued by Allis-Chalmers Mfg. Co. presents rules and practices required to assure safety in this work. The 75-page pocket size manual carries rules relating to crane operation and describes safe hitching equipment and practices. In addition, the publication provides safe load tables for various types of slings, shackles, "S" hooks and eyebolts with instructions for their use. For your copy, write to Allis-Chalmers Safety Services Section, Box 512, Milwaukee 1, or —
Circle Inform-A-Gram No. C2.

Data on the Corrosion Resistance of Titanium is found in a bulletin from Mallory-Sharon Titanium Corp., Niles, O. Various uses of titanium based on its corrosion resistance are described. Corrosion ratings for the metal when exposed to many types of corrosive agents are also included. For a copy of the bulletin, "Design Away Corrosion with Titanium," contact the company, or —
Circle Inform-A-Gram No. C3.

A Weldirectory for stainless steels, non-ferrous metals, cast iron and manual hardsurfacing has been published by The Lincoln Electric Co., Cleveland 17. The specific type of work and the properties of the weld metal together with the electrode to be used are discussed and the applications listed. Obtain copies of Weldirectory SB-1352 from the company, or—**Circle Inform-A-Gram No. C4.**

A Methods Manual for Carmet carbide metal tools is available from Allegheny Ludlum Steel Corp., Carmet Div'n, Detroit 20. It will aid users of Carmet cemented carbides in the selection, fabrication and application of tools and blanks. Included are descriptions of the various grades as well as instructions and drawings covering all operations and tool types. Also presented is a table of cutting speeds.
Circle Inform-A-Gram No. C5.

New Tolerance Tables and Additional Size Ranges for square, rectangular and round carbon and stainless steel welded Electrunite mechanical tubing are described in reference data. Wall, desk and pocket-type charts list the tube, wall and cut length tolerances in addition to chemical analyses and weight. Copies of this data are provided by Steel and Tubes Div'n, Republic Steel, 224 E. 131st St., Cleveland 8, or —
Circle Inform-A-Gram No. C6.

The Various Tool Steels are grouped into four divisions, Classes 1, 2, 3 and 4 with a set of grinding specifications for each class in the booklet, "Grinding Wheel Specifications for Tool and Die Steels." Also contained in the booklet is an explanation of electronic formulation, photos of typical applications and general information. Copies of Form 438 are provided by Bay State Abrasive Products Co., Westboro, Mass., or—**Circle Inform-A-Gram No. C7.**

"How to Machine Meehanite Castings." This publication contains general machining data for Meehanite metal. Then it details specific operations such as engine and turret lathe, boring mill and milling machine operation, multiple machining on an automatic chucking machine and special machining operations. One section is devoted to Meehanite milling cutter bodies and tool shanks, complete with diagrams and illustrations. Also shown are tool shapes and cutting angles. Copies of Bulletin 29 are issued by Meehanite Metal Corp., 714 North Ave., New Rochelle, N. Y., or —
Circle Inform-A-Gram No. C8.

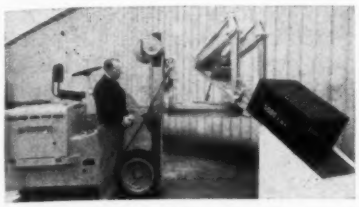
High Speed Indexing Drives are highlighted in Catalog 106 from Ferguson Machine & Tool Co., Roller Gear Div'n, P. O. Box 5841, St. Louis 21, Mo. One section details the calculation of load requirements, giving methods, formulas and sample calculations. Also included are design applications, load rating tables and typical assembly drawings. In addition, the catalog contains selection procedures, component and housing dimensions, ordering information, data on high speed index table and special designs. Contact the company for a copy of Catalog 106, or —
Circle Inform-A-Gram No. C9.

Thread, Cylindrical and Special Gages are highlighted in a new 24-page catalog from Godwin Gage Co., 26538 W. Seven Mile Rd., Detroit 19. Included are tolerances for thread and plain cylindrical plug and ring gages, details on three wire measurement and conversion tables.
Circle Inform-A-Gram No. C10.

"How the Shell Mold Process Is Applied in Industry." This brochure details the shell mold process for making high volume castings previously made by conventional green sand practices. Discussed are the advantages of the process, how it is applied to castings difficult to mold and how the shell process reduces machining operations and provides better dimensional control. Shown are typical examples of castings produced by the shell mold process. Central Foundry Div'n, General Motors Corp., 37 Florence St., Saginaw, Mich., will provide copies of the brochure, or —
Circle Inform-A-Gram No. C11.

Die Handler Especially for Inclined Presses

An exclusive feature of Automatic Transportation Company's new die handler developed for loading and removing dies from inclined presses is that its table can be rotated 180° horizontally, permitting dies to be loaded or unloaded from any angle of approach. This means that the truck upon which the die handling attachment is mounted need not be



in a direct line with the press or at right angles to it, thus giving the truck greater maneuverability.

The table of the attachment tilts, permitting the operator to position and retrieve dies in die presses inclined up to 45°. The attachment works off the truck's hydraulic system and is controlled by a portable pushbutton panel.

Ingenuity Shakes Out a Production Bottleneck

In this day of automation and electronic brains the solution to a tough production problem is frequently thought of in terms of costly specialized equipment. Charley Bartz, Plant Superintendent of R. Krasberg & Sons Manufacturing Company, Chicago, recently proved that a little gadgeteering can sometimes do a better job.

It is extremely important to Krasberg & Sons, who manufacture precision stampings, that their finished stampings be delivered free of slugs and chips. The sorting and cleaning

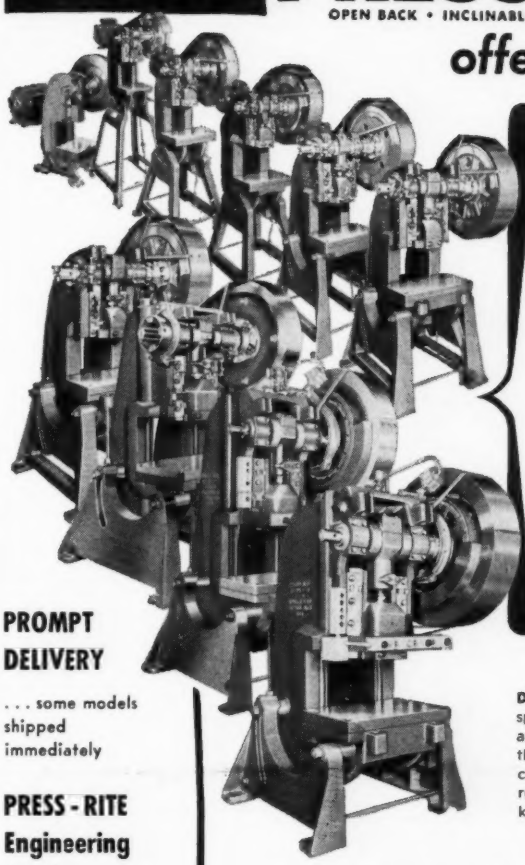
of stampings was a time consuming, hand job until Charley got his brainstorm.

Instead of handling each piece, Charley decided to build a vibrating screen that would shake the slugs from hundreds of stampings in one operation. Using several feet of Dexion Slotted Angle, a handful of bolts, and a Cleveland Air Vibrator, he had a table built in his own shop at a cost of less than $125 for materials, much less than the price of a ready-made vibrating screen.

Free shaking action, which is initiated by the Cleveland Vibrator, is achieved by mounting the screen frame on eight coil springs. The screen itself fits loosely in the framework and is easily lifted out so that different sized screening may be substituted for varying sized slugs and stampings. The table, which is 40" x 40" x 36" overall, has a hopper bottom that dumps the slugs directly into a scrap box.

Every stamping produced by Krasberg & Sons is now cleaned without special handling. Charley estimates that this homemade gadget saves 60 man-hrs/week, and plant output is no longer limited to the speed of the cleaning gang.

NOW PRESS-RITE
OPEN BACK • INCLINABLE Power Presses
offers you...



Profit Making POWER PRESSES
• AUTOMATIC or MANUAL FEED •
2 to 85 TON CAPACITIES

PROMPT DELIVERY
. . . some models shipped immediately

PRESS-RITE Engineering Service
Send us drawings or sample. Our engineers will gladly select the right press. All recommendations are based on years of actual press experience. No obligation of course.

10 Capacities:
2 TON 30 TON
5 TON 37 TON
10 TON 45 TON
15 TON 60 TON
20 TON 85 TON

Dies Last Longer . . . Press-Rite's special alloy, high strength frame and tie-rod design gives rigidity that really pays off in reducing costly die wear. You get longer runs between die grinds and keep dies at peak efficiency.

Airflex Clutch and Rotor-Seal Timer . . . for maximum power and greatest production. The High-Speed Clutch has SIX operating positions. It also protects dies against accidental breakage—air-pressure is adjusted for-the-job and allows the clutch to slip on "double headers".

Automatic Feeds, Variable Speed Drive . . . We'll "factory equip" your Press-Rite with the latest controls and mount automatic feeds for high speed operation.

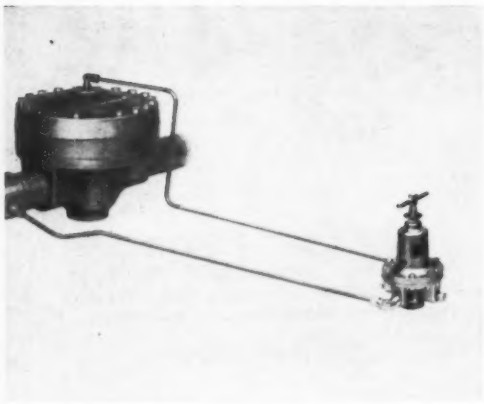
Write today for Catalog and Distributor's Name

SALES SERVICE MACHINE TOOL CO.
2351 University Ave. St. Paul W14, Minn.

PRESS-RITE
OPEN BACK • INCLINABLE Power Presses
CIRCLE INFORM-A-GRAM KEY NO. 227

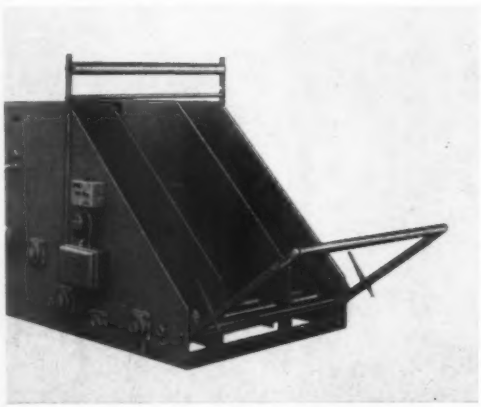
PROGRESS

NEW DEVELOPMENTS • IMPROVEMENTS • COST AND TIME SAVERS



AIR PRESSURE REGULATOR . . .

Model 20AA-16 is a 2″ pilot-controlled, high capacity regulator for extreme precision in air control. It reduces line pressures of up to 400 psi to working pressures of from 2 to 125 psi. Temperature range is from —40°F to 200°F. C. A. Norgren Co., 3401 S. Elati St., Englewood Colo., or **Circle No. A1.**

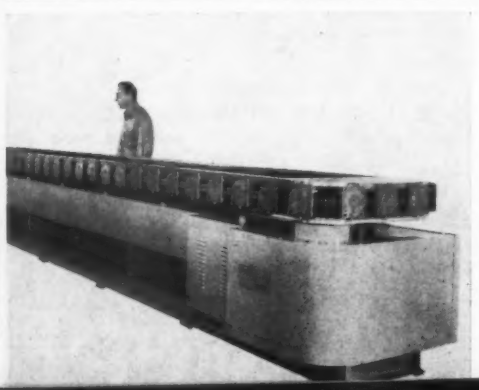


COIL CRADLES . . .

A new series of improved "Koil-Kradles" has been announced by Benchmaster Mfg. Co., 1835 W. Rosecrans, Gardena, Calif. The units handle coil stock up to 48″ wide and 60″ dia in capacity ranges from 1,200-lb coils to 16,000-lb coils. They supply a slack loop from which any automatically fed machine can draw. **Circle No. A2.**

GEAR GAGER . . .

Model GRD is an automatic gear gaging, sorting and machine tool control unit which will check individual spur or helical gears up to 3″ dia and 3″ wide. It will check gears for both size and helix angle accuracy or size or helix angle only. National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, or —**Circle No. A3.**

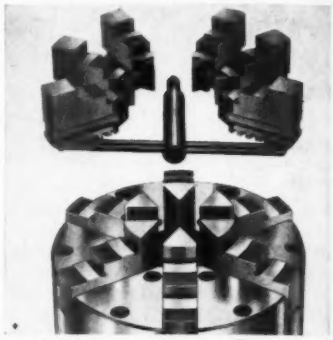


AUTO-TRAN UNIT . . .

The Auto-Tran designed as a standard indexing machine chassis, is now available as a continuous motion unit for processing and assembly operations. The rate of carrier movement is infinitely adjustable, and remotely controlled and tachometer indicated. Swanson Tool & Machine Products, Inc., Erie, Pa., or—**Circle No. A4.**

LARGE CHUCKS . . .

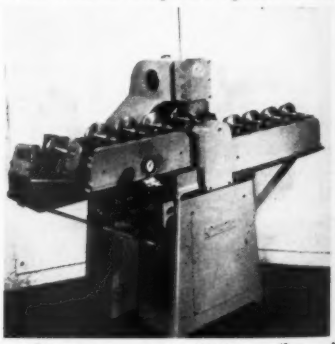
Adjust-Tru chucks, 3 and 6-jaw models, of 8″, 10″ and 12″ dia have been announced by Buck Tool Co., 2015 Schippers Lane, Kalamazoo, Mich. They feature adjustment to dead true within a minute and automatic take-up for wear. These chucks which are constructed for heavy duty work have a guaranteed precision within 0.0005″ chuck-



ing duplicate pieces. Previously the largest size universal Adjust-Tru chuck was 9″ dia. **Circle Inform-A-Gram No. A5.**

PINION GEAR MARKER . . .

Model 395 is designed to mark code numbers on pinion gears as they come off the production line. The unit is fed by a conveyor chain which carries the pinions under the concave lettering tool, after which they are rolled to the discharge chain from which they are ejected. The

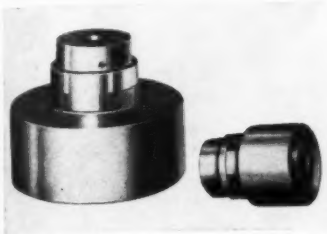


production rate is 900 pcs/hr. A pneumatic cushion is provided in the die holder to accommodate diameter variations, insuring uniform depth of marking on both low and high tolerance limits. Geo. T. Schmidt, Inc., 4112 Ravenswood Ave., Chicago 13, or — **Circle No. A6.**

ON PARADE

Mail FREE Inform-A-Gram Card for MORE Details.

FLEXIBLE COUPLING . . .
This flexible coupling with brake drum flange provides a space-saving drive arrangement. This feature is useful where shaft length or distance between two units is at a premium. The

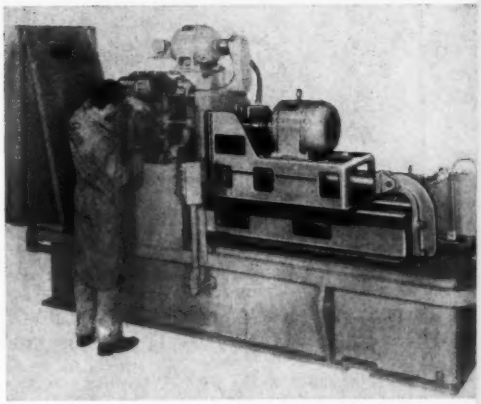


coupling is available in eight standard sizes with horsepower ratings from 2 to 40 at 1750 rpm. Lovejoy Flexible Coupling Co., Dept. TPC, 4801 W. Lake St., Chicago 44, or —
Circle Inform-A-Gram No. A7.

DUPLEX BURR-MASTER . . .
Deburr and chamfer both sides of gears simultaneously with the Duplex Burr-Master. Both stations can be used for deburring and chamfering of the same size and type of gear or spline or different parts can be handled on each station. Model BMED-24 has a work range from 0.625" to

6.5" pitch dia and Model BMED-29 handles work from 3.0" to 9.5" pitch dia. These machines feature automatic work cycles, simplicity of tool re-sharpening, infinitely variable depth of chamfer and preset tooling. Modern Industrial Engineering Co., 14230 Birwood Ave., Detroit 38, or —
Circle Inform-A-Gram No. A8.

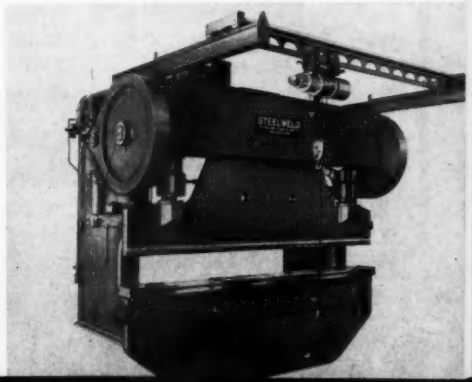
FEED UNITS . . .
Series 20-400 and 20-401, a new line of standard horizontal and vertical way type hydraulic feed units, has been announced by The Hartford Special Machinery Co., 292 Homestead Ave., Hartford 12, Conn. They feature balanced thrust to provide thrust above the ways near the tool load, developing a maximum thrust of 12,000 lbs.
Circle No. A9.



SPEED LATHES . . .
Types CP (vertical) and CSL (horizontal) speed chucking lathes have been added to the line produced by The Standard Electrical Tool Co., Mt. Hope & Sixth Sts., Cincinnati 4. They will perform secondary operations for finishing aircraft and automotive parts.
Circle No. A10.

BORING MACHINE . . .
A wide variety of toolroom work and short production runs can be handled by Style 2112-B precision boring machine. It will perform boring, turning, chamfering and facing operations. The machine features selective cycle equipment, variable speed drive and universal fixture. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, or —**Circle No. A11.**

PRESS BRAKE WITH CRANE . . .
This press brake with a crane built-in facilitates handling heavy plates into a machine. The crane is 18' long and can be traveled as far as 8' to the front of the bed center. The machine is rated for 20' x 5/8" mild steel. The Cleveland Crane & Engineering Co., Wickliffe, O., or —
Circle No. A12.



For DRILLING, CORE DRILLING, ROUGH and FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work — or both.

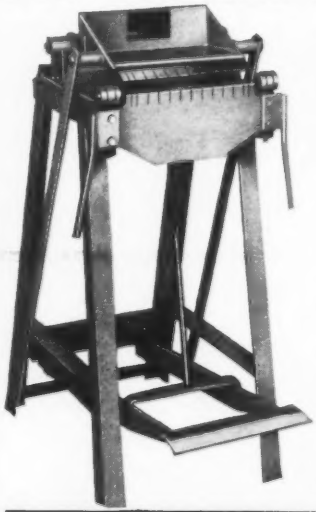
Eliminates expensive tool construction — Reduces tool wear — Prevents seizure and pilot breakage — Especially adapted where precision is required.

Write for full information and prices

GATCO ROTARY BUSHING CO.
42322 ANN ARBOR RD., U. S. 12, PLYMOUTH, MICH.
Telephone PLYMOUTH 1472

CIRCLE INFORM-A-GRAM KEY NO. 2301

BEND DRUM RETURN FOR LETTERS FASTER!



3/16" SLOTS
3/4" DEEP ON
1" & 1/2" CENTERS
ACCOMMODATE
SEAMED & FOLDED
DRUM RETURN

CLAMPING BY
FOOT TREADLE

CAPACITY 20 GA.
INCLUDING
STAINLESS

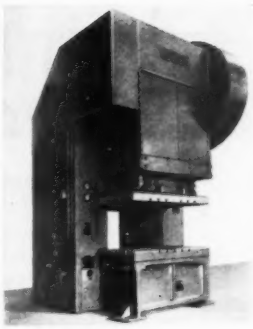
HEIGHT 39"

WEIGHT ONLY
50 LBS. FOR
EASY MOVING

WHITNEY-JENSEN NO. 99
Letter Forming Bending Brake

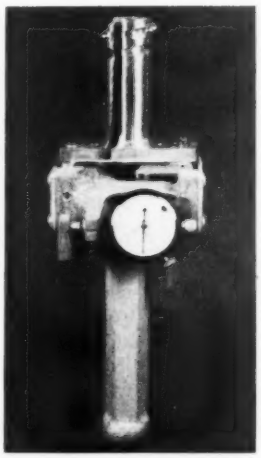
WHITNEY METAL TOOL COMPANY
712 Forbes St., Rockford, Ill. Since 1910

CIRCLE INFORM-A-GRAM KEY NO. 2302

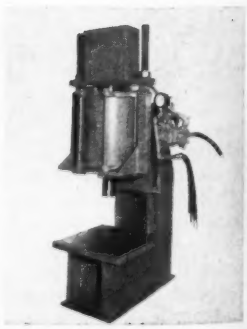


A "Streamlined" Gap Press features totally enclosed piping and wiring and automatic lubrication system. The electrical control system includes extra outlets and cams for tying the press into automation lines and for automatically operating ejector type dies. A central lifting hook simplifies setting and moving the press. Verson Allsteel Press Co., 9300 S. Kenwood Ave., Chicago, or—
Circle No. A13.

Ductility Testing of Sheet Metal is performed by this unit produced by Steel City Testing Machines, Inc., 8817 Lyndon Ave., Detroit 38. The company also manufactures a motorized hydraulic bench type Brinell hardness tester and a ductility cup tester designed for testing thin metals ranging from 0.003" to 0.062" in thickness.
Circle No. A14.



Internal Ball Thread Segments for checking the size of internally threaded circulating ball nuts have been developed by Bryant Gage and Spindle Div'n, Bryant Chucking Grinder Co., Box 620, Springfield, Vt. Each of these segments which are used with Bryant No. 21 portable thread gage, carry three balls located adjacent to each other. The balls in opposite segments are 180° apart giving a direct diameter reading and providing a quick positive centering action.
Circle No. A15.



Riveting, Forming, Bending, press-fitting, etc. are performed by a new line of heavy duty Vi-Speed air arbor presses. Shown is one of the 16 models available ranging from 1 to 5 tons. They have up to 6¾" throat clearance and any stroke from a minimum 2" to the 12" maximum ram clearance. Van Products Co., 5778 Old Ridge Rd., Erie 7, Pa., or—
Circle No. A16.

WAIT! Save Money!
DO THAT JOB FASTER AND BETTER WITH A Severance MIDGET MILL!
Ask for a SEVERANCE catalog today! YOU'LL FIND IT DETAILED, WELL ILLUSTRATED, SUGGESTIVE AND INFORMATIVE. IT INCLUDES LOW REGRINDING PRICES.
YES, A SEVERANCE MIDGET MILL MAY WELL SOLVE YOUR PROBLEM AND SAVE YOU MONEY, IF YOU MUST REMOVE GATES, FINS, AND RISERS; BREAK SHARP CORNERS AND EDGES; MACHINE CARBON; FINISH CASTINGS OF ANY MATERIAL; WORK FILLETS, RADII, AND GROOVES; DEBURR OIL HOLES; BLEND WELDED AND ASSEMBLED PARTS; REMOVE FLASH; SMOOTH WELD BEADS; OR ANY OTHER SIMILAR OPERATIONS
MANY STANDARD SHAPES & SIZES TO CHOOSE FROM
SPECIAL SHAPES & SIZES AVAILABLE ON SHORT NOTICE
Severance MIDGET MILL SET No. 77
SEVERANCE MIDGET MILL SET NO 77 IS A POPULAR SET OF 1/2" DIAMETER, 1/4" SHANK, HIGH SPEED MIDGET MILLS. MAKES A FINE GET-ACQUAINTED-SET AND WILL COVER A BIG MAJORITY OF YOUR NEEDS FOR THIS TYPE TOOL. LEAFLET NO.651 GIVES DETAILED INFORMATION AND PRICES. ASK FOR IT TODAY!
Severance TOOL INDUSTRIES INC.
730 Iowa Avenue, Saginaw, Michigan
CARBIDE HAND FILES
REGRINDING
INSIDE DEBURRING CUTTERS
OUTSIDE DEBURRING CUTTERS
HAND DEBURRING CUTTERS
TUBE END DEBURRING CUTTERS
CHATTER-FREE ECONO-SINKS
SPECIAL CUTTERS
MICRO-MILLS & BORE-MILLS
BALL SEAT REAMERS

Representatives and Distributors in Principal Industrial Areas

CIRCLE INFORM-A-GRAM KEY NO. 2311

Punches and Dies

...for foot and power presses

Standard Punches and Dies of all sizes and shapes in stock—or made promptly to order. Also Adaptors and Die Shoes to convert your press. For power, foot or hand operation.

Round, square, rectangular, slotting, notching, louvre, angle, multiple, knock-out and other shapes. Precision made from high grade tool steel. More than 25,000 sets in stock to choose from.

Send for free illustrated catalog No. 154-AF NET PRICE SHOWN! *What are your punch and die needs?*

WARD Machinery Co. 564 West Washington **Chicago 6**

CIRCLE INFORM-A-GRAM KEY NO. 2313

Let this automatic
STOCK FEED STOP
cut your labor bill!

DAHLSTROM AUTOSTOP
for punch press dies

$1.75 each

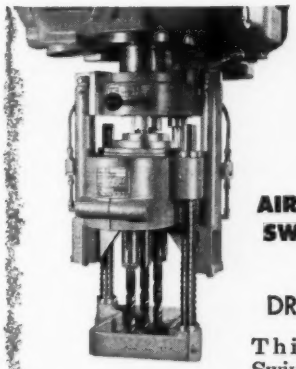
★ SPEEDS PRODUCTION
★ CUTS WASTE
★ INCREASES PROFITS

Every stroke is a production stroke when your press is equipped with the amazingly simple *Dahlstrom Autostop!* It's been tested and proven in years of actual use. Adjustable to work with *blanking, progressive or compound dies.* Mounts on stripper plate in 15 minutes—handles sheet steel up to 1/32" x 6" or equivalent weight. Lots of 12 or more, $1.50 each. Indicate compound or progressive dies.

Write for complete line bulletin describing Autostop, Tap Guides and Tap Chucks.

DAHLSTROM MANUFACTURING CO. 16 Olson Drive • North Branch, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 2312



NEW
DRILL HEAD
AIR COUNTERBALANCE SWIVEL ATTACHMENT
FOR RADIAL DRILLING MACHINES

This new combination Swivel and Air Counterbalance attachment makes it possible to adapt large multiple spindle drill and tapping heads to radial drilling machines. Flexible and easily adjusted, it insures maximum safety for the operator, as well as better operating economy.

Attachment includes air filter, pressure regulator, and an air oiler, and incorporates a 360° swivel feature fully aligning the drill head. It operates equally well with the fixed center type head and the adjustable type head.

This package is ideally suited for drilling condenser plates, boiler tube sheets, flue sheets, etc.

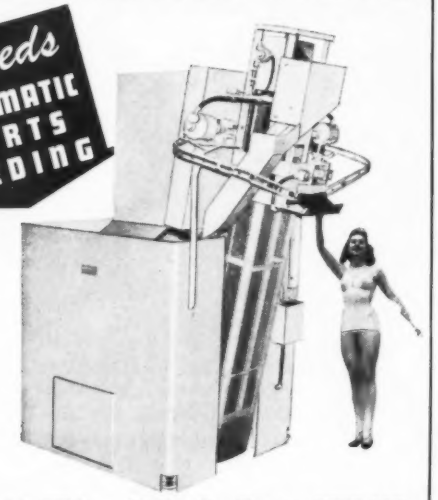
Manufacturers of all types of Fixed Center, Adjustable, and Individual Lead Screw Tapping Heads

US DRILL HEAD — THE UNITED STATES DRILL HEAD COMPANY
BURNS STREET • CINCINNATI 4, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 2314

WORLD'S LARGEST HOPPER

Speeds AUTOMATIC PARTS FEEDING



Think of it! With a *45 Cu. Ft. Hopper* FEEDALL Model 2500B elevates parts and feeds them thru multiple chutes to assembly lines or production machines. Huge hopper saves storage space — prevents floor cluttering.

Work Range: Rolling Parts 5″ in dia.; 3/16″ to 1½″ long.
Sliding Parts 3/16″ to 2″ in dia.; 6″ long.

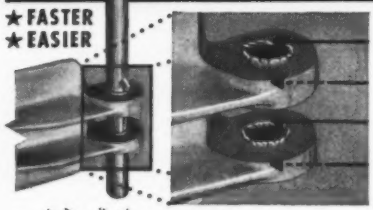
Complete Specifications on request. In writing advise purposes for which automatic feeds are required.

FEEDALL INCORPORATED WILLOUGHBY, OHIO

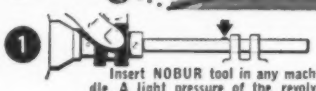
CIRCLE INFORM-A-GRAM KEY NO. 2321

HOW TO.... DEBURR THESE INACCESSIBLE HOLE FACES BY MACHINE OPERATION with the amazing NOBUR TOOL

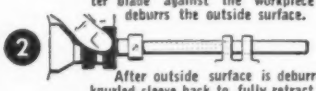
★FASTER
★EASIER



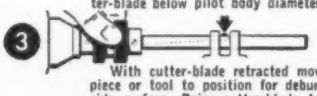
No more hand finishing methods for those hard-to-get-at inner surfaces on multi-wall parts. The NOBUR Tool with its double edge cutting blade does the job in seconds . . . all by **machine operation.** Can be used by anyone, with complete safety, on your own lathe, drill press, etc. Simple to operate.



1 Insert NOBUR tool in any machine spindle. A light pressure of the revolving cutter blade against the workpiece quickly deburrs the outside surface.



2 After outside surface is deburred, slide knurled sleeve back to fully retract the cutter-blade below pilot body diameter.



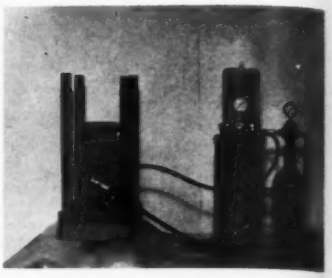
3 With cutter-blade retracted move workpiece or tool to position for deburring inside surface. Raise cutter-blade to deburr first one surface then the other.

Write for FREE Folder
Send for all details on Nobur Tool Products TODAY!

N-11

NO/BUR TOOLS NOBUR MANUFACTURING CO.
6860 Farmdale Ave., No. Hollywood, California

CIRCLE INFORM-A-GRAM KEY NO. 2322



This Improved Hydraulic Overload Press Bed Jack is used in punch presses where briquetting, embossing, marking, pressing, riveting, etc. operations are being performed. The unit can be mounted to the bolster plate or fastened to the press bed proper. Dayton Rogers Mfg. Co., 2824—13th Ave., S., Minneapolis 7, or — **Circle Inform-A-Gram No. A17.**

Designed to Reduce Waste Motion and prevent operator fatigue is a new line of tool balancers which will accommodate any suspended load up to 50 lbs. The line includes seven models — three for smaller lighter tools and four for heavy-duty use. All balancers have straight-line pull eliminating excessive wear on the cable. Gardner-Denver Co., Keller Tool Div'n, Grand Haven, Mich., or — **Circle No. A18.**

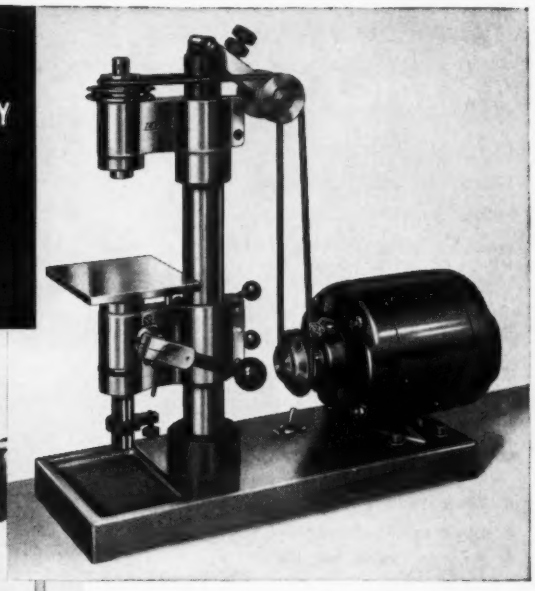
This Oscillating Spindle Sander-Grinder uses abrasives on work spindles under ¾″ dia. It is provided with spindles ¼″, ⅜″, ½″ and ¾″ dia. With the smaller diameters, any kind of scroll-grill work or small radius contours can be machine finished faster and better. Boice-Crane Co., 963 Central Ave., Toledo 6, or— **Circle No. A19.**

Precision Barrel Finishing of metal and plastic parts is performed by a multi-barrel finishing unit. Model MMB is used for slide-honing small component parts, eliminating expensive hand finishing methods. As many as ten finishing barrels 3″ to 8″ dia can be mounted on its 24″ revolving disc. BMT Mfg. Corp., 131 E. 9th St., Elmira Heights, N. Y., or— **Circle No. A20.**

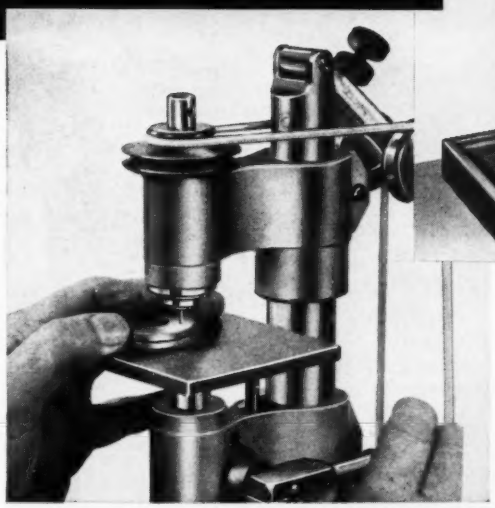
SMALL DRILLS MUST BE HELD
IN PRECISION COLLETS TO ASSURE ACCURACY

LEVIN® MICRO-DRILL PRESS

FOR VERY SMALL HOLES
DOWN TO .002"



In the LEVIN micro-drill press drills are held in precision collets. Runout is reduced to practically zero and drill breakage from this cause is eliminated. Collets are available in a complete range of sizes down to .1 mm (.004").



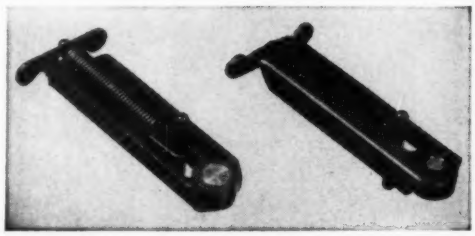
Size of table is 3-3/4" x 4". Maximum table travel is 1-1/2". Greatest distance between table and end of spindle 4". Preloaded ball bearing spindle with four speeds 1725, 2600, 3000, 4700 RPM. Motor 1/2 HP, 110V, 60C. The micro-drill press may also be had with a 3450 RPM motor, doubling the above speeds.

Send for catalog M describing complete line of micro-drilling equipment, collets, instrument lathes and precision tools.

LOUIS LEVIN & SON, INC.
3610 South Broadway • Los Angeles 7, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 2331

FOR POSITIVE STOCK ALIGNMENT
IN PROGRESSIVE DIES



Amcor Roller Stock Pushers

SPEED UP PRODUCTION with precision-made AMCOR Roller Stock Pushers. Easy, smooth stock feeding, without buckling, assures more production with less operator fatigue.

SAVE MONEY. AMCOR Roller Stock Pushers sell for just a fraction of what hand-made bench models cost to make.

SIMPLE TO INSTALL. Requires only a slot milled in the stripper plate, and a hole drilled in the die block and stripper plate. Tracing template for slot and hole location is supplied. When die is sharpened, no refitting is necessary.

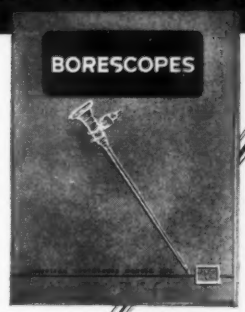
The AMCOR Roller Stock Pusher is quickly adaptable to any work specifications. Distributors throughout the country stock a complete line of nine models to fit all production needs.

Write us for complete information

APPLIED MECHANICS CORPORATION
160 LYON, N. E. GRAND RAPIDS MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 2332

INSPECTION PROBLEMS?
This booklet is for you!



This comprehensive, elaborately illustrated booklet provides practical information on the use of the famous A. C. M. I. Borescope in various industries, for the inspection of interior areas or surfaces not otherwise visible—together with full data on the types of Borescope available, and on their care and maintenance. Have you received your copy?

Free on request *Fill in and mail today*

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1241 LAFAYETTE AVENUE NEW YORK 59, N. Y.

Gentlemen: Please send me without obligation a copy of your booklet on Borescopes.

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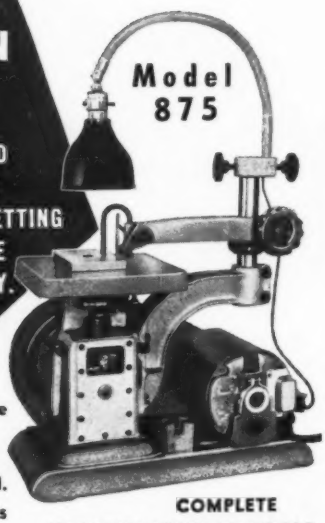
CIRCLE INFORM-A-GRAM KEY NO. 2333

Only the **ALL AMERICAN**
PRECISION FILING MACHINE HAS THE PATENTED BALL AND SOCKET JOINT FILE CLAMP WITH FILE SETTING SQUARE TO INSURE INSTANT ACCURACY.



- Files, saws, hones.
- 380 Strokes per minute —⅞" stroke.
- Table readily tilted.
- Tools quickly changed.
- Has no equal at its cost.

COMPLETE WITHOUT LAMP OR TOOLS
F.O.B. OUR PLANT **$150.**

SEND FOR LITERATURE

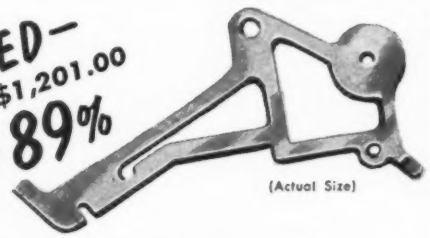
MANUFACTURERS OF ALL AMERICAN VIBRATION FATIGUE TEST MACHINES

ALL AMERICAN Tool & Manufacturing Co.

8039 LAWNDALE AVE., SKOKIE, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 2341

SAVED— $1,201.00 or 89%


(Actual Size)

After consultation with our engineering staff and with the use of dies from our tremendous library maintained specifically to save our customers time and money, this part illustrated actually saved one manufacturer 89% of usual production costs!

Price breakdown was as follows:

Tools	$152.00
Labor	.069
Material	.0053

LOW die cost
FAST delivery

- Blanking
- Forming
- Piercing
- Drawing
- Extruding
- Stenciling
- Tapping
- Countersinking
- Plating
- Machining
- Painting
- Grinding
- Welding

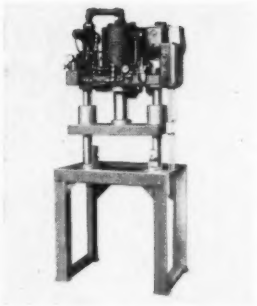
Yes, WLS SPEEDTOOLING for small quantity stamping needs is a saver every time! A radical production advancement, it eliminates most of the cost required for permanent dies. Finished parts are produced to tolerances as close as those from tools costing ten times as much. When jobs are completed WLS SPEEDTOOLING is stored for future use.

Use WLS for production quantities up to 100,000 when low cost, fast delivery, possible design changes for virtually nothing, are important factors!

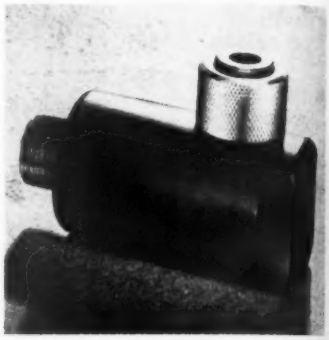
FREE
1. Write now for a free sample part with a cost summary.
2. Our free bulletin also illustrates 40 small stampings.
3. Send in your blueprints to our engineering department for a prompt quotation.

WLS STAMPING COMPANY
3283 E. 80th Street • Cleveland 4, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 2342

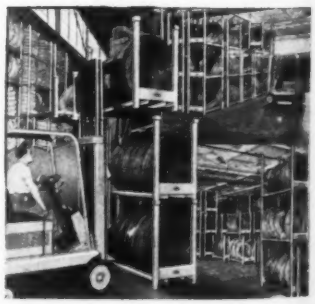


Broaching, Staking, Swaging, Stamping, shearing, blanking and forming operations are performed by a high speed 20-ton hydraulic trim press. It features a 3-hp motor and high speed ram travel in both directions and occupies a small amount of shop space. The Mohler Engineering Co., 33 Roetzer St., Buffalo 11, or—**Circle No. A21.**



A Cutting Oil Aerator has been developed with non-clog thru-hole construction. It is used on production machine tools such as turret lathes, grinders, milling machines, etc. The unit is installed directly in the feed line and operates with any pump. American Aerator Co., Inc., 36-B E. 13th St., Patterson, N. J., or — **Circle Inform-A-Gram No. A22.**

Hand Finish Small Parts such as automotive, aircraft parts and jet blades with a high speed polishing lathe with shortened spindle. Model 5-ROL has a speed up to 6500 rpm. It has a combination brake and switch operated by a single lever. Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo, Mich., or — **Circle No. A23.**



Simplify Wire Coil Storage with a new line of wire coil racks introduced by Jarke Mfg. Co., 5407 N. Broadway, Chicago 40. Each rack has a 3" under clearance permitting forklift entrance from all four sides. Three standard models are available and other sizes can be furnished. Complete details are in Bulletin R-300 issued by the company, or—**Circle No. A24.**

GEORGE L. DETTERBECK CO.

SINCE 1911

World's Largest Exclusive Manufacturer of
SCREW MACHINE TOOLS!

CUTTING CAMS
HIGH SPEED STEEL AND CARBIDE FORM TOOLS
SPECIAL CUTTING TOOLS
SPLIT DRILL BUSHINGS
CROSS SLIDE KNURL HOLDERS
TOOL BITS
BOX TOOLS
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RECESS SWING TOOLS
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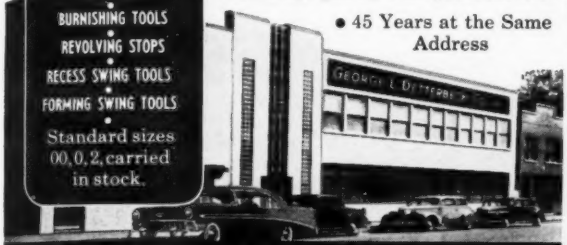
Standard sizes 00, 0, 2, carried in stock.

We specialize in one thing only... designing and making SCREW MACHINE TOOLS!

45 years experience goes into every tool we make. They come to you ready for use... Precision design... Skilled workmanship... Finest materials.

Our extensive facilities save you TIME... MONEY... and give you accuracy, quality and quick service.

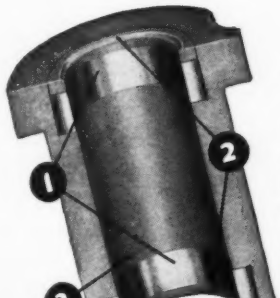
• 45 Years at the Same Address



GEORGE L. DETTERBECK CO.
1871 Clybourn Avenue • Chicago, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 2351

INCREASE PRODUCTION.. SAVE TIME & MONEY



*PATENTED
1. Tungsten carbide rings at the points of wear; 2. Steel rings protect drills and carbide; 3. Special hardened alloy steel body.

For information and prices write for MEYCO Bushing Catalog No. 41

MEYCO
Carbide Inserted Bushings Are Doing It Daily!

How? Like this: (1) Last longer ... with a life—in most cases—as long as solid carbide bushings at prices that approach the price of steel bushings; (2) Increased life for your drill jigs and fixtures; (3) Increased life for your drills and reamers; (4) Accuracy maintained for a LONG PERIOD of time; (5) Less non-productive machine time, less lost man-hours, because bushings need not be changed as often; (6) Inspection time saved, because of greater accuracy for a longer time; and (7) Less waste due to spoilage, for the same reason. Don't pass up a good bet! Get the dope on MEYCO Carbide Inserted Drill Jig Bushings today!

ESTABLISHED 1888

W. F. MEYERS CO., INC., BEDFORD, INDIANA

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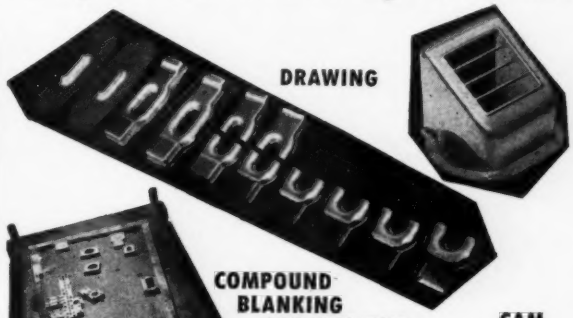
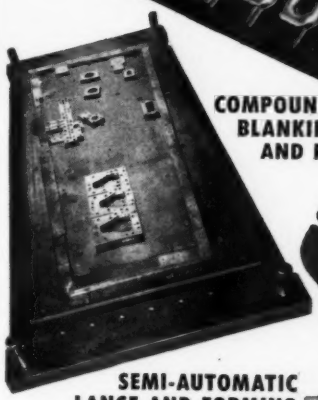
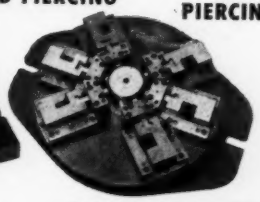
CUSTOM DIES by WHISTLER

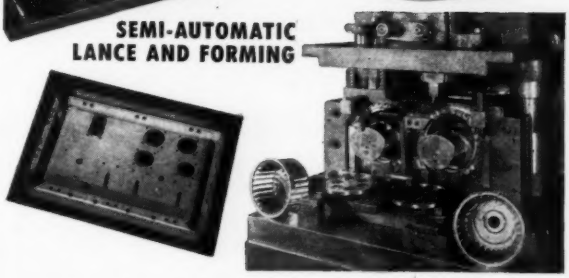
✓ EXPERIENCE
✓ STAFF
✓ CAPACITY

For nearly half a century S. B. Whistler & Sons, Inc. have been manufacturing custom dies for the top names in industry. With our large staff of experienced engineers and skilled tool and die makers, supported by extensive mechanical facilities, we offer a dependable die making service to any manufacturer whose product calls for the working of sheet metals.









You are invited to send us your specifications and drawings for cost estimates and delivery schedule. See for yourself how Whistler dies are stepping up production and cutting costs in plants coast to coast.

S. B. WHISTLER & SONS, INC.
748 Military Road, Buffalo 23, N. Y.

ADJUSTABLE, MAGNETIC and CUSTOM DIES FOR ALL INDUSTRY
Direct Factory Representatives Located in Principal Industrial Areas

"Visit us at Booth 2014 — National Metal Exposition, Cleveland — Oct. 8 to 12"
CIRCLE INFORM-A-GRAM KEY NO. 2353

HOLES JIG GROUND with *Vulcanaire*

Provide yourself with this inexpensive* instrument for use on your present equipment and JIG GRIND with a guarantee.

A five station indexing fixture from Vulcan's Contract Tool Room (Your tool room in Dayton).

Using a jig borer index table with the Vulcanaire 5 indexing holes and 35 locating and clamping holes were JIG GROUND in place. Result—eliminated all close locating and dowelling of individual parts and of course hours of time.

*Vulcanaire equipment pays for itself on the first job.

Borrow Vulcan's instructive movie on jig grinding

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Engineering, Processing, Designing . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and Size . . . Vulcanaire Grinding Heads . . . Motorized Rotary Tables . . . Plastic Tooling . . . Vulcanaire Jig Grinders.

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741 LORAIN AVENUE DAYTON 10, OHIO

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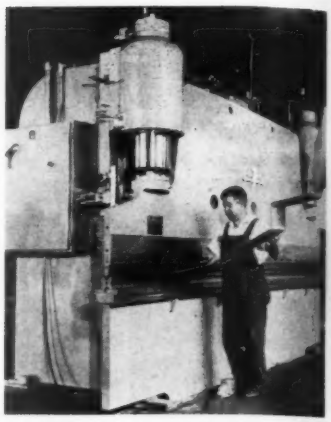


Form Up To Seven Different Angles in succession without resetting controls with a new hydraulic press brake. Range is from 12" deep bends formed in a single stroke to bends of less than ⅛" with press cycling at 50 strokes/min or more. The press brake which is accurate to within thousandths of an inch, is used for straightening, extruding, shearing, etc. Pacific Industrial Mfg. Co., 848—49th Ave., Oakland 1, Calif, or — **Circle Inform-A-Gram No. A25.**

An Automatic Lubricator Filling System will maintain a constant level of lubricant in lubricator bowls from a central oil supply. The system will operate with Arrow air line lubricators in ⅜", ½", ¾" and 1" pipeline sizes. Arrow Tools, Inc., 1928 S. Kostner Ave., Chicago 23, or— **Circle No. A26.**

This Digital Read-Out Automatic Micrometer eliminates mental interpretation of a dial or scale position into the digits of a decimal dimension. Model HDR Carson-Dice electronic micrometer has a measuring range of 1" (⅞" with standard micrometer tip) and a throat depth of 2". Repeatability is 0.00002". J. W. Dice Co., Englewood, N. J., or—**Circle No. A27.**

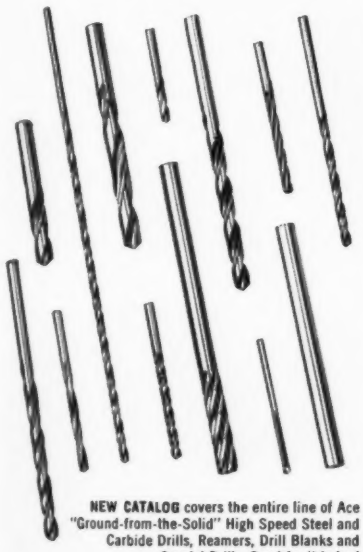
An Internal Grinding Spindle Rated at 19,000 Rpm Maximum is a feature of Model USL universal tool and cutter grinder. The table size is 36¼" x 5½". Special table and saddle bearing arrangement insures extremely smooth and free movement of the table. The grinder has a telescoping metal-enclosed spindle column. Aaron Machinery Co., Inc., 45 Crosby St., New York 12, or — **Circle No. A28.**

New "Series 333" Drills for Drilling Cast Iron!

ACE
CARBIDE DRILLS

Whatever your carbide drill requirements may be . . . whether solid carbide or carbide tipped . . . it always pays to make sure you use an "ACE". Their "ground-from-the-solid", highly polished flutes have keener, stronger cutting edges. And that means finer accuracy, longer tool life, and lower drilling costs for you!

Call your local Ace Drill Distributor today!

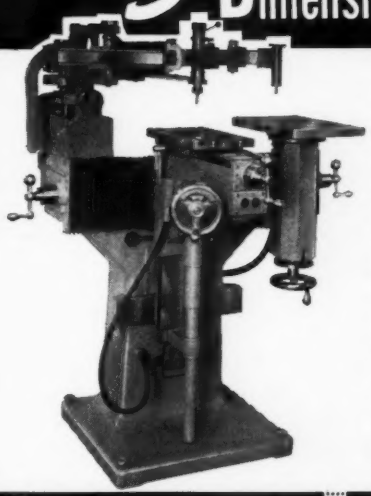


NEW CATALOG covers the entire line of Ace "Ground-from-the-Solid" High Speed Steel and Carbide Drills, Reamers, Drill Blanks and Special Drills. Send for it today!

ACE DRILL
ADRIAN, MICHIGAN
ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

CIRCLE INFORM-A-GRAM KEY NO. 2371

3-Dimensional panto-miller



For accurate pantograph milling on all 3-dimensional work, the "Panto-Miller" 3A is a sturdy production machine. Accurately reproduces copy on flat or curved surfaces, in reduced or magnified size.

NEW:

Capacity for workpiece height.
Sensitivity of linkage.
Range of pantograph ratios.
Accuracy of reproduction.
Finger-Tip Control of spindle speeds.
Ease of operation.

The new Panto-Miller 3A is an economical answer to many standard *and* special production problems. Write for Bulletin PM3, which gives details and specifications.

2-Dimensional panto-miller

Versatile and dependable for continuous service, the J & B "Panto-Miller" 2A:

Engraves
Profiles
Die Cuts
Mills

Investigate its advantages for your own applications. Send for Bulletin PM2

3-WAY Indexing Trunnion

Simple, Rapid, Positive positioning of workpiece or jig for all angle Drilling, Tapping, or Counterboring. Available with Chuck, Faceplate, or Right-Angle Adaptor Plate. Complete with Station Selector. For details, ask for Bulletin 173.

WITH RIGHT ANGLE ADAPTOR

WITH FACE PLATE

J&B EST. 1870
JOHNSON & BASSETT, INC.
PRODUCTION TOOL DIVISION
WORCESTER, MASSACHUSETTS

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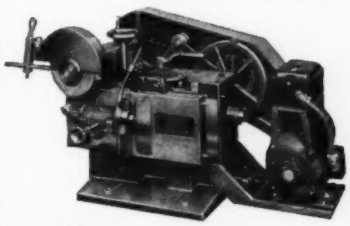
AUTOMATIC METAL SAW GRINDER
Cuts Costs . . Makes Money For You!



Wardwell's "35 T" will sharpen up to 115 saws .015 thick at one time . . .

This includes slitting and screw slotting saws and milling cutters. Takes saws from 2" to 5½" diameter. Completely automatic. No attention is required after machine is started. These ingenious, compact and sturdy grinders are saving and making money for their owners all over the world.

You owe it to yourself to write for Bulletin 35 T containing full information.

WARDWELL
3809 Ridge Road
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Maker of Largest Line of Saw and Tool Sharpening Machines

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DUSTKOP STOPS DUST

DUST COLLECTORS

SAVES INSTALLATION TIME

Stop dust quickly, at lower cost, with Dustkop. Thirty-seven standard models *ready to use* and available from stock. Dustkop conserves floor space, reduces maintenance. Collects almost all types of industrial dusts. Write for descriptive literature.

Also a complete line of Mist Collectors

AGET MANUFACTURING COMPANY
1394 East Church St. • Adrian, Michigan

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HAND KNOBS

6 SIZES
CAST IRON

Tapped, Reamed or Blank.
Hex-shaped hub for extra tightening.

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Dept. HK-2 • Englewood, Ohio

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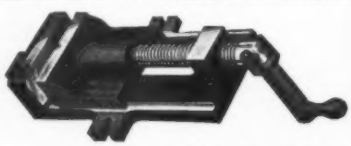


Cut Costs!

with the NEW YOST DRILL PRESS VISE

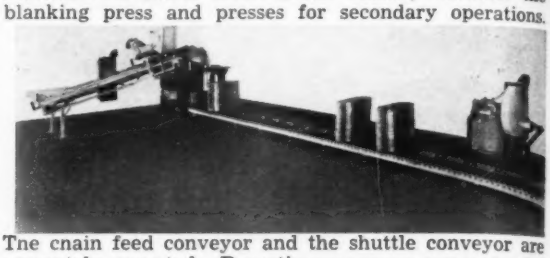
- Developed expressly for use on drill press operations.
- Does away with special and costly jig fixtures.
- Available in two sizes:

No.	Jaw Width	Max. Opening
1D	3½"	4 "
2D	5 "	5½"

Write today for bulletin on the extensive Yost line.

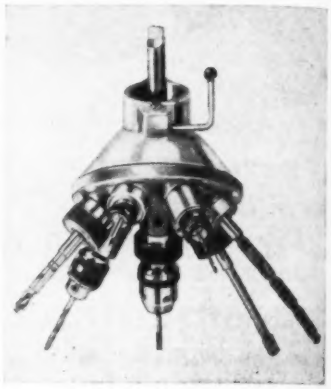
YOST MFG. CO. 124 Grant St., Cambridge Springs, Pa.
CIRCLE INFORM-A-GRAM KEY NO. 2383

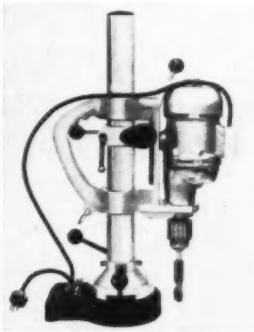
Eliminate Tote Boxes for Storing Blanks with the Press-to-Press Automat system that conveys, stacks, shuttles and stores sheet metal blanks, between the blanking press and presses for secondary operations.



Tne cnain feed conveyor and the shuttle conveyor are separately operated. Downtime on one press never interferes with production on the other press. Michigan Production Engineering Co., 1796 E. 9 Mile Rd., Hazel Park, Mich., or — **Circle Inform-A-Gram No. A29.**

Tap 2 to 7 Different Size Holes with One Chucking using the Jemco ARBO-2 automatic revolving and indexing multi-spindle drill head. All spindles are completely interchangeable. Ten independent speeds are available. Jersey Mfg. Co., 456 Livingston St., Elizabeth, N. J., or — **Circle No. A30.**





An Electro-Magnetic Base is a feature of the Mag-Tool drill press produced by Magnetic Tool Corp., 1955 Lafayette St., Santa Clara, Calif. The drill press can be magnetically attached to ferrous surfaces for on-the-spot drilling, reaming, tapping and other drill press operations. Micro-Matic adjustment permits movement of the drill bit for precise positioning after the base is locked in place. **Circle No. A31.**

Position and Move the Welding Head with an automatic ram type manipulator. Both ram travel and travel **of entire unit** on track are controlled by an electronic variable speed drive unit providing a speed range of 5 to 100 ipm. Dynamic braking stops the ram instantly. C. B. Herrick Mfg. Corp., 2000 Center St., Cleveland 13, or — **Circle Inform-A-Gram No. A32.**

You Can Rely on a **ROUSSELLE**

THESE 40-TON PRESSES take job after job in stride and give you top speed and uniform output on a variety of work. They stress simplicity in every detail to achieve quicker set-ups, easier changeovers and simpler operation. All are extra rugged, high precision units, made to withstand hard usage and assure long, satisfactory service. They are *very moderately priced.*

Manufacturers of Rousselle Presses

Significant savings may result if you let our engineering staff assist you. There is no obligation.

●

Rousselle Presses are sold exclusively through leading machinery dealers.

●

Choice of 25 models in 5 to 40-ton sizes.

SERVICE MACHINE CO. 2310 West 78th Street • Chicago 20, Ill.

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Anything . . . in THROW-AWAY *INSERTS,*

CARBIDE, CERAMIC and OXIDE

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Throw-Away Inserts, all Sizes and Types in any quantity · · Our Specialty

Send prints for quotations on Negative and Positive rake Inserts. Standard Inserts carried in stock for IMMEDIATE SHIPMENT.

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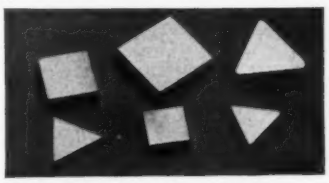

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Cutting Tool Engineers and Manufacturers

100 NICHOLS ROAD SHELTON, CT.

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Royco's fast delivery offers the solution to your tap problems and at a reasonable price. Acme, square thread, buttress, etc.—Royco grinds them all.

Royco has a large stock of special taps ready for immediate delivery, plus a complete line of standard taps and thread gages. The Royco catalog incorporates all new tap standards and explains them clearly.

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LIFTING DEVICES

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FAST · SAFE · BETTER Material Handling of

· SHEETS
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400 MODELS

Prompt Delivery
Write for full particulars

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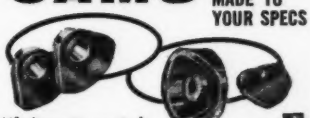
CAMS ALL TYPES MADE TO YOUR SPECS



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Dr. Chas. Eisler ME, Founder
Chas. Eisler, Jr., Pres.

EISLER ENGINEERING CO., INC.

732 SO. 13TH ST. NEWARK 3, N. J.

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All New!

COMPLETE REAMER CATALOG

with the **WORLD'S GREATEST REAMER SELECTION**

by the thousand's

by . . . STYLES
RANGES • DIMENSIONS
QUICK SELECTIONS
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ITEMIZED

BUY SUPEREAM!

Simplified so you can find the price and size at a glance.

SUPEREAM REAMERS are stocked and sold in more sizes than any other reamer in the whole world. (includes decimal)

Why Buy Specials?

Why buy reamers from several sources when you can buy them all from stock under one roof. YOU benefit by quick delivery, greater uniformity, simplifies your bookkeeping and saves time, money.

ASK FOR IT—*It will pay you to investigate.*

TWENTIETH CENTURY MFG. CO., Box 429 TP
Libertyville, Illinois

GENTLEMEN: Send us the NEW SELECTIVE CATALOG No. 10A.

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For world's greatest selection of REAMERS!

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CUT PRODUCTION COSTS!
MARK
NAME PLATES
5 TIMES
FASTER

MODEL EMT-1
ELECTRIC TAG TYPEWRITER
A touch of the finger delivers up to 2 tons pressure for deep, legible impressions in metal or plastic tags.

—WITH—
Automark
ELECTRIC TAG MARKING MACHINES

MODEL SRST-2
HI-SPEED
TAG MARKING MACHINE
Automatically marks BOTH constant and serial numbers at any desired speed up to 8,000 tags per hour!
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Some Territories Still Available
Send Now for Bulletin

DEFIANCE MACHINE & TOOL COMPANY
1920 S. VANDEVENTER Dept. PT ST. LOUIS 10, MO.

CIRCLE INFORM-A-GRAM KEY NO. 2401

MILLING MACHINE
SPACING COLLARS
SAVE TIME
ON GANG MILLING
SET - UPS

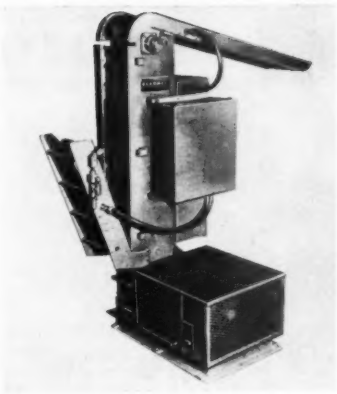
These MICROMETER ADJUSTABLE SPACING COLLARS are designed for accurate spacing of side milling cutters, gang milling and various other multiple setups on milling machines. Accurate spacing of the milling cutters is easily made by merely loosening the cutter arbor nut and making a plus or minus adjustment.

You will be assured of a QUICK, ACCURATE and POSITIVE ADJUSTMENT at all times.

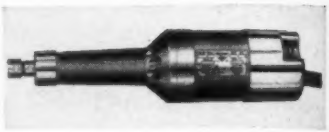
For immediate delivery specify size and mail orders to . . . . . .

Size of Cutter Arbor	Maximum Outside Diameter	Price
⅜	1-9/16	$12.75
1	1-13/16	12.75
1¼	2-1/16	13.25
1½	2-7/16	13.25
1¾	2-3/4	16.75
2	3-1/16	19.50

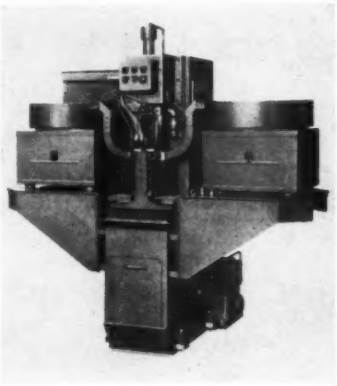
DAYTON ROGERS
Manufacturing Company
MINNEAPOLIS 7 B, MINN.
CIRCLE INFORM-A-GRAM KEY NO. 2402



This Elevating Transfer Conveyor is designed to transfer long cylindrical parts from one production machine to another. Special Model 4000 will handle cylindrical parts from ⅜" to 1¼" dia and up to 12" long. The unit can be modified for individual requirements. Feedall Inc., Willoughby, O., or—**Circle No. A33.**



The Latest Developments in high-speed burrs and mounted points are used by No. 320 high speed hand die grinder available in four models. The grinders are made in two styles—long nose (shown) and snubby nose, each in two speeds—20,000 rpm or 30,000 rpm. The grinder is ideal for all hand operations as well as for many applications using special jigs and fixtures. Millers Falls Co., Greenfield, Mass., or —**Circle Inform-A-Gram No. A34.**



Produce 4,160 Radius Grooves/Hr with an automatic hydraulic broaching press. It broaches a radius groove in both ends of two different length pinion gear blanks. Detroit Broach & Machine Co., Dept. 143, Rochester, Mich., will provide literature with complete details, or—**Circle No. A35.**

This Snap-Action Foot Switch replaces other footswitches previously contained in the line produced by Lectromatic Devices Corp., 3347 Addison St., Chicago 18. Model 1000 handles high inductive loads with a minimum of arcing. It provides foot-control starting and stopping of motors, machine tools, welding equipment, etc. **Circle Inform-A-Gram No. A36.**

FRICTION SAWING with Tannewitz

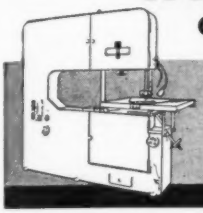
HIGH SPEED BAND SAWS

FASTEST, BEST MEANS OF CUTTING METALS

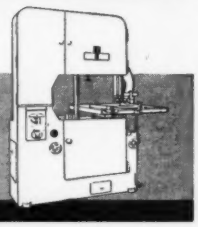
If you are not familiar with the advantages of friction sawing with these machines, by all means drop us a line asking for "Friction Sawing Data." You can save many times the cost of a Tannewitz High Speed Band Saw and greatly expedite production by using it to cut sheets of both hard and soft steel, formed or flat, trimming malleable and steel castings, cutting armor plate or many other materials. Write NOW!

THE **TANNEWITZ WORKS**

GRAND RAPIDS, MICHIGAN ☎ **GL-6-1729**



TANNEWITZ DI-SAWS — 24", 36", 48", 60" CAPACITIES
for CONTOUR SAWING, FILING, POLISHING
The smoothest, fastest, most trouble-free Di-Saws on the market. Write for bulletin.



CIRCLE INFORM-A-GRAM KEY NO. 2411

Gage Company **PRECISION PLASTIC**
COMPARATOR SCALES

Non-breakable...accurate...designed for making quick measurements at scale on projectors and comparators without any movement of machine or work.

An unexcelled tool for use in drafting and constructing scale layouts for comparator chart use. All standard magnifications and various styles for every application.

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GAGE COMPANY
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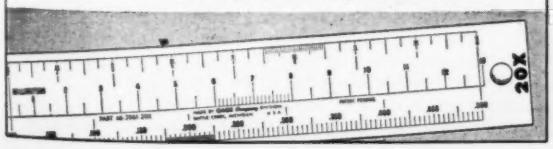
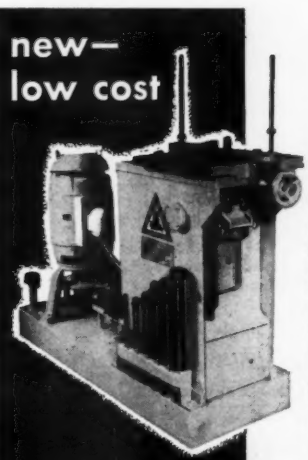


CIRCLE INFORM-A-GRAM KEY NO. 2412

new— low cost



HYDRAULIC KEYSEATER

- fast set-up — saves time and money
- low cost operation — uses standard tool bits
- heavy-duty hydraulic circuit—assures accurate keyways
- compact, 21" x 61"— no special foundation
- versatile—cuts standard, tapered keyways; internal splines

ONLY WITH BLISS' new Hydraulic Keyseater can you get such a size range *from one machine*—¼" to 2" wide, to 12½" long, standard or tapered. It's easily set up for short or long production runs in small, medium or large plants, warehouses, maintenance departments. What's more, no foundation is needed. Speeds range up to 35 spm; heavy-duty hydraulic system is to JIC specs. All adjustments are readily accessible. Seven cutter bars, with standard tool bits, are also available. Special attachments permit internal spline cutting.

Get all the cost-cutting, time-saving facts by writing today for Bulletin 34 —

BLISS SINCE 1857

E. W. BLISS COMPANY
1132 North Seventh Street
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FREE... 64 PAGE CATALOG

WORLD'S LARGEST LINE OF WORK HOLDING EQUIPMENT—CHUCK JAW BLANKS, CAST ALUMINUM AND MALLEABLE KNOBS, WHEELS, HANDLES—PLUS HUNDREDS OF OTHER JIG AND FIXTURE COMPONENTS

COMPLETE DETAILED SPECIFICATIONS
ENGINEERING DRAWINGS • COST SAVING DATA
write for your copy—TODAY!

JERGENS TOOL SPECIALTY CO.
Dept. TE-10 712 E. 163rd St., Cleveland 10, Ohio

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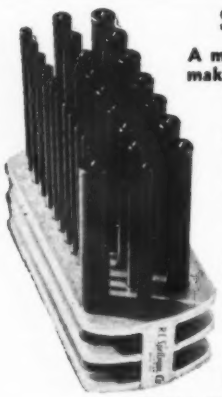

SPELLMACO SPOTTERS

A matched set of transfer punches for toolmakers, machinists and tool cribs.

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel carefully heat treated and tempered for long life. .0025 undersize to facilitate use—black oxide finish.

Set No. 3-17: 28 punches with indexed stand—Sizes 3/32" to ½" by 1/64" plus handy 17/32" size—length 4⅞". PRICE only $17.90

Single size available.

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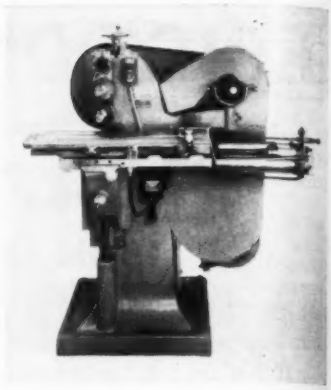
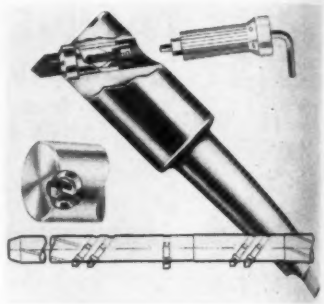


An Automatic Table Feed Device and Dual Spindle Arrangement doubles the production capacity of U. S. Hand Mills. Two vises or other workholding fixtures can be mounted on the table so two or more workpieces can be milled during each complete pass. The two-spindle head can also be adapted to U. S. Burke hand or power table feed millers. U. S. Burke Machine Tool Div'n, Cincinnati Mfg. Corp., Cincinnati 27, or—
Circle Inform-A-Gram No. A37.



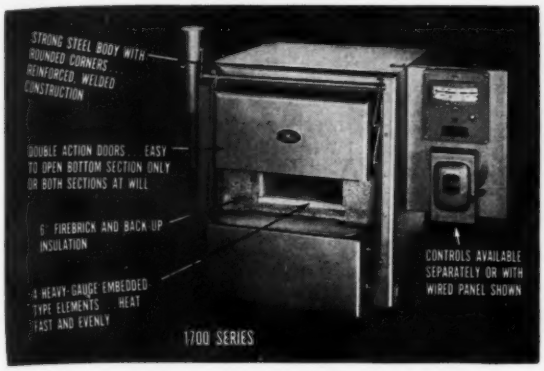
The Acra-Bore Cartridge can be installed in cutting tools without sending to the factory for mounting. It is available from stock in three sizes or made to customer specification. This micrometer adjustable cutting tool featuring simplicity of installation, can be applied to boring bars and other metal cutting tools and used singly or in clusters in cutter heads for multi-purpose operations. The Gairing Tool Co., 21221 Hoover Rd., Detroit 32, or—
Circle Inform-A-Gram No. A38.

Complete Control of closed-circuit ii-TV equipment is now possible for industrial and institutional applications from a variety of remote control units. Full 360° camera viewing and 90° tilt are obtainable with both indoor and

outdoor mountings. Shown are closed-circuit ii-TV camera, Model PD-150-5, and outdoor pan and tilt unit, Model PD-126, produced by General Precision Laboratory Inc., Pleasantville, N. Y., or —
Circle Inform-A-Gram No. A39.

SAVE HOURS, CUT COSTS: Heat treat small parts, tools, dies, etc. in your own shop or plant with a versatile, highly efficient Temco Electric Furnace.

Why tie up your big equipment on small heat treat jobs below its capacity, or why "farm out" heat treating of parts, tools, dies? Put a TEMCO bench-type electric furnace in your shop and see how it pays for itself over and over again — in time-savings, cost savings, and production conveniences.


STRONG STEEL BODY WITH ROUNDED CORNERS REINFORCED, WELDED CONSTRUCTION
DOUBLE ACTION DOORS . . . EASY TO OPEN BOTTOM SECTION ONLY OR BOTH SECTIONS AT WILL
6" FIREBRICK AND BACK-UP INSULATION
4 HEAVY-GAUGE EMBEDDED TYPE ELEMENTS . . . HEAT FAST AND EVENLY
CONTROLS AVAILABLE SEPARATELY OR WITH WIRED PANEL SHOWN
1700 SERIES

Temco Furnaces are economical to own and operate . . . easy to hook up . . . easy to use. Eight models with chamber sizes from 4" x 3¾" x 3¾" to 9½" x 8½" x 18". $60 to $563 complete with controls. Write for data and nearest dealer's name.

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Thermo Electric Mfg. Co.

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Expanding Mandrels

Accuracy 001" - No Distortion

No Slipping - Everlasting

K. O. LEE CO.

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If it's made by **Lee** *it's a* **"Knock-Out"**

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Buy safe "SHUR-GRIP" drop forged HANDLES

Designed to hold 3 to 6 lb. lead hammer heads more firmly — will not slip — keeps hammer head in shape longer — makes re-molding easier, quicker, surer, less expensive.

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UNIVERSAL PARKSON GEAR TESTER

FOR SPUR - WORM AND HELICAL & BEVEL GEARS

ABOVE PHOTO SHOWS SET-UP FOR WORM GEARS TO CHECK CENTER DISTANCE, CONTACT OF TEETH, RUNOUT, ETC.
CYLINDRICAL BUSHING
Scale and Vernier, Ease of adjustment, Convenient Features to hold Worm and Shaft on V-Blocks or Bushing.
ADJUSTABLE V-BLOCK

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the best diamond wheel ever developed for carbide tool grinding. Guaranteed ultimate cutting life from each diamond particle in every wheel.

US

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IMMEDIATE DELIVERY on all wheel sizes, STRAIGHT, DISH, CUP, FLARE and MOUNTED WHEELS; HONES.

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IN 11 SIZES No. 6 to 1" N.C. In all S. A. E. sizes.

You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench —no other tools needed. Get more work now—save money too!

HEIMANN MFG. CO. • URBANA, OHIO

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do your
Ductility Testing
quick & easy

The turning of a single hydraulic control knob clamps the specimen, tests it, then releases it The test is made in plain view, and the maximum pressure indicators show the result until reset. This highly sensitive sheet metal tester will take up to 3/16" thick specimens and exert up to 30,000 pounds pressure, at any desired rate of speed. Hydraulic mechanism is all neatly enclosed. Write for catalog sheet and prices.

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Since 1903
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TWIST DRILLS – REAMERS

Ever since 1903, when Celfor pioneered in the forging and hot-twisting of high speed drills, "Celfor" tools have been specified by the nation's leading steel fabricators for the drilling and reaming of the really rugged jobs in the toughest alloy steels.

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DIVISION OF AVILDSEN TOOLS & MACHINES, INC.
MAKERS OF "REPUBLIC," "CENTURY," "CELFOR" AND "U. S. EAGLE" BRAND TOOLS
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CIRCLE INFORM-A-GRAM KEY NO. 2442

No. 5

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Multiform
BENDER-CUTTER
CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to form and cut round or flat stock up to 1/8"x1 1/2" as illustrated. Punching and round end blanking dies available. Other models up to 1/4"x4" air operated.

ALSO AIR OPERATED MODELS

J. A. RICHARDS CO.
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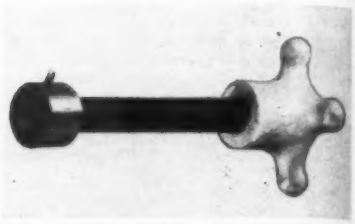
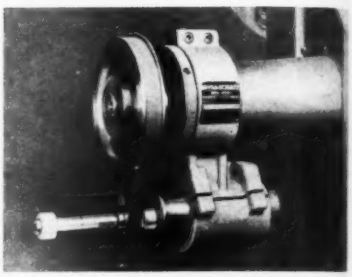
This Clamp Shoe Assembly is used for solid clamping or irregular surfaces. Available in a wide range of sizes, the work holding device fea-



tures a swivel shoe to prevent marring of polished surfaces. Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland, or —
Circle Inform-A-Gram No. A40.

Grind Angles or Slots too small to permit the use of standard size grinding wheels with a new high speed grinding attachment for use with surface grinders. It will also grind serrations, T-slots and many



other hard-to-get-at surfaces. The grinding attachment is also used on small radii and small contours in die blocks. Spindle speed is 14,000 rpm. Boyar-Schultz Corp., 2000 S. 25th Ave., Broadview, Ill., or—
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Perform Press Forming or Metal Removing Operations on both ends of rod or tubular production parts from 1' to 24' long and up to 6" dia with a new line of automatic, high-speed, double-end machines. Pro-

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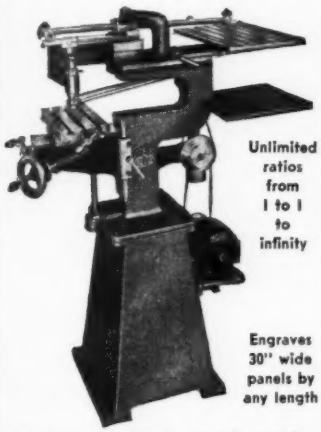
PREIS Model 2D-4 ENGRAVING MACHINE

"A medium sized machine that does the work of a larger one"



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No engraving shop is complete without a PANTO ENGRAVER. Several models available for 2 and 3 Dimensional Engraving.

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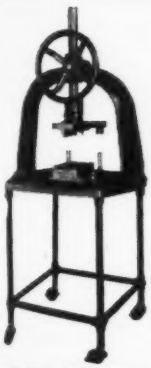

COMPLETE THE DIE-SET AT YOUR BENCH

Lacey Die-Set Machine

Here's a truly "one man" press. It operates with one hand. Handy for tool and press rooms, it permits the die-maker to complete a die-set at his bench ... saves toolroom and handling costs. Ask today for full details.

Sole Distributors

MOORE SPECIAL TOOL CO., INC.
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CIRCLE INFORM-A-GRAM KEY NO. 2452

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New Low Cost
LIGHT-DUTY OILER-STRAIGHTENER
$95.00

Handles stock up to 3" wide, 1/4" (app.) thick

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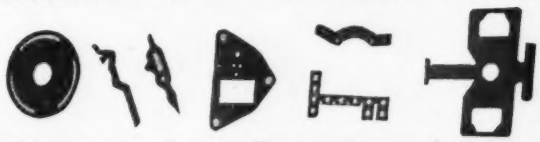
STAMPINGS - - - SHORT RUNS



A dependable service for small quantity requirements for new developments and production up to 50,000 pieces. QUICK DELIVERY — ACCURACY — backed by 25 years' experience.

SMALL LOT STAMPING CO.

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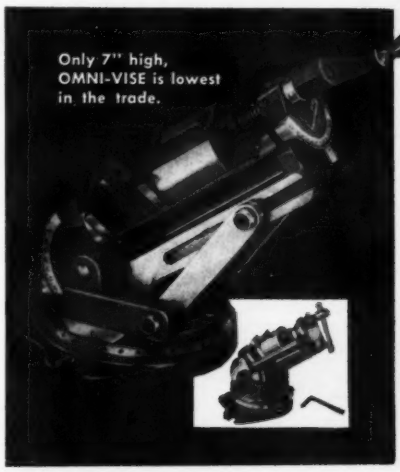
CIRCLE INFORM-A-GRAM KEY NO. 2454

Make any type spring, without arbors, FAST with Perkins Spring Coiler!

When you need a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005" to .125", you can produce it in a matter of seconds with the new Perkins Precision Spring Coiler! You entirely eliminate the use of arbors, yet turn out precision springs — torsion, compression, extension tapered, or special springs — coiled either left or right hand, in any desired length, any diameter from 1/16" to 12" and larger, with or without initial tension, and with open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications for replacements or experimental work. Make them fast right in your own shop!

Power model for continuous runs, on welded steel console base



Only 7" high, OMNI-VISE is lowest in the trade.

Hold any machine work at any EXACT angle with sturdy OMNI-VISE!

Accurately set in all three planes in only 15 seconds, this sturdy precision vise made in two capacities saves time and headaches for progressive shop operators and pays for itself quickly. Only 7" high (lowest in the trade), **OMNI-VISE** #4, shown at top, is tough, weighs 74 lbs. Jaws are 4" x 1½", open to 4". Base is 9" in diameter with one side straight. Inset shows **OMNI-VISE** #2, a precision low-priced vise. Users find it exceptional for grinding compound angles on carbide tools. Weight, 16 lbs. Height, 4¾". Jaws, 2⅛". Opening, 2⅛". Base, 7¼" x 5". For grinding, drilling or general work at any angle, by hand or machine, an **OMNI-VISE** is the machinist's choice.

EXCLUSIVE DISTRIBUTORS OF PRECISION MACHINE TOOLS

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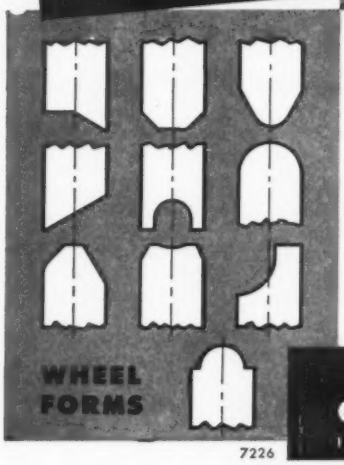
CIRCLE INFORM-A-GRAM KEY NO. 2455

Precision Dress Grinding Wheels to ANY FORM IN ¼ THE USUAL TIME



The Perfex TANGI-MATIC Dresser is a self-contained precision tool built by an organization of master gagemakers for high precision work.

Any shop man who can read a "mike" can operate the dresser the first time. No Jo Blocks, no height gages or other auxiliary tools needed. All radii and angles are read directly.

Write for Descriptive Bulletin

PERFEX

PERFEX GAGE & TOOL CO.
123 AVERY ST. • MT. CLEMENS, MICH.

7226

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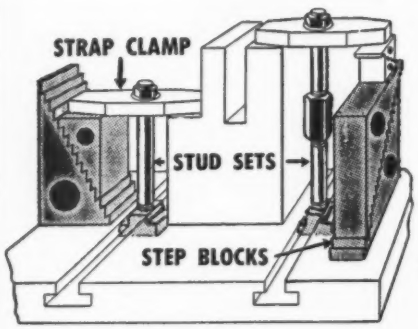

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Clamping tools of all types.

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TIETZMANN TOOL CORP.
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CIRCLE INFORM-A-GRAM KEY NO. 2462

HARDENED and GROUND HSS BLANKS

Any decimal diameter — any length. Mirror finish surface to gage tolerance.

Many uses —
—core pins, punches, gages, ejector pins, insert pins, special tools, etc. — Quick delivery.

Write or phone DRexell 6-4223 for price list D-3

WILLIAM T. HUTCHINSON CO.
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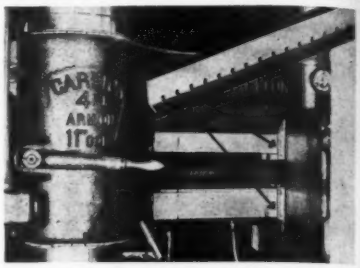
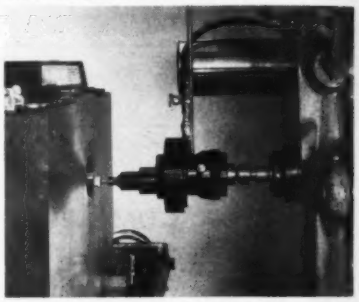
CIRCLE INFORM-A-GRAM KEY NO. 2463

Protect Machine Tool Ways and cut downtime and maintenance with a new way wiper. The C/R Sirvene way wiper wipes the ways clean and leaves a thin protective oil film. The way wiper which is easily installed on milling machines, shapers, grind-



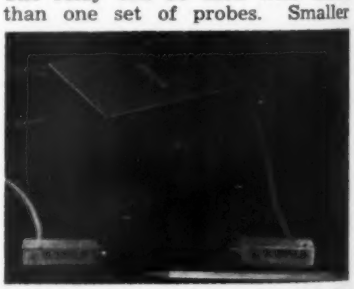
ers, planers, gear cutters and hydraulic rams, is made in four different types. A brochure with details is supplied by Chicago Rawhide Mfg. Co., 1267 Elston Ave., Chicago 22, or—**Circle Inform-A-Gram No. A43.**

Uninterrupted High Precision Internal Grinding is performed by the Grind-A-Matic jig grinding attachment. Two interchangeable spindles are available, one with speeds up to 12,000 rpm and the other having a



maximum speed of 75,000 rpm. With standard equipment, the attachment grinds holes from ⅛" to 2½" dia. Perfex Gage & Tool Co., 123 Avery St., Mt. Clemens, Mich., or — **Circle Inform-A-Gram No. A44.**

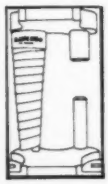
No Tubes or Transistors Are Used by this photo-electric relay. The photo cell and light source are contained in probes only 3" x 1" x ⅝". The relay can be used with more than one set of probes. Smaller



probes, stainless steel probes, polyethylene probe covers and several enclosures are available. Tri-Tronics Co., 2607 St. Charles Rd., Bellwood, Ill., or — **Circle Inform-A-Gram No. A45.**

ON Dies EQUIPPED WITH

ELASTICONE GUIDE PIN COVERS



Day after day, year after year, manufacturers of ALL products are discovering how Elasticone Guide Pin Covers can work for them . . cutting die costs by eliminating the need for spare dies. Inexpensive Elasticones close the gap between pins and bushings, protecting dies against breakage . . protecting workers against injuries. Available in sizes to fit most pins and bushings.

Write for complete literature and new Technical Bulletin 53

CENTRAL Safety Equipment Co.

6603 Marsden St. PHILADELPHIA 35, PA.

CIRCLE INFORM-A-GRAM KEY NO. 2471

MAYLINE

the

MAY-O-MATIC Table Has ALL the Features!

This table is instantly adjustable for height and tilt. It has a solid Basswood metal-edge top, and sliding reference top. Accessories are Auxiliary Drawer unit, and a 5 Drawer Metal Plan File.

For complete information see your local dealer. Or, if necessary, write directly to factory.

Symbol of MAYLINE Superiority

Mayline Company
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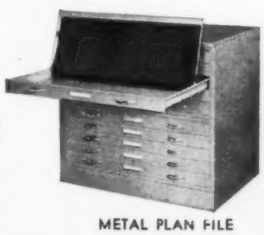
Sheboygan, Wisconsin



METAL PLAN FILE

MAYLINE

CIRCLE INFORM-A-GRAM KEY NO. 2472

ACCURACY .0002 T.I.R.

.0002 T.I.R. OR LESS AT SPINDLE NOSE, .0005 T.I.R. OR LESS ON TEST ARBOR SIX INCHES FROM SPINDLE NOSE

SPINDLE SPEEDS 150 and 250 RPM Other Spindle Speed Pulleys Available

MODEL B943 MOTOR DRIVEN WORK HEAD

No. 11 B & S Tapered Spindle Standard Equipment. No. 12 B & S or No. 5 Morse Available at Slight Extra Cost. Same Accuracy Guaranteed!

The B943 Motor Driven Work Head is a compact self-contained power unit for internal and external grinding. It is held in position by two T-slot bolts and can be mounted at any convenient spot on the table. The swivel base, which is graduated 90° one side of center and 45° on the other, permits the Work Head to swivel full 360° if desired. Swivel base can be easily removed from head permitting units to be mounted on table without base if desired. The B943 is easily and quickly mounted on other makes of grinders.

The No. 11 B & S tapered spindle, mounted on ball bearings, is hardened and ground, and is designed to receive chucks, collet fixtures, face plates, straight or tapered sleeves, centers and like equipment. Unit is grease packed at factory and requires no service in the field for the life of the bearings. Streamlined in design, this fixture is quickly mounted and is easy for the operator to keep clean.

The special motor is provided with conveniently located reversing switch which is handy for the operator regardless of the position of the work table or rotation of the work. Motor operates quietly and is fully protected from dust and from any oil entering from working parts.

See this extremely accurate B943 work head at your equipment dealer or write for complete literature.

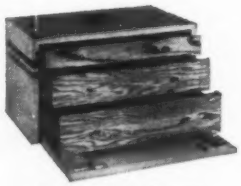
K. O. LEE COMPANY

ABERDEEN, SOUTH DAKOTA

CIRCLE INFORM-A-GRAM KEY NO. 2473

INDUSTRIAL MAGNIFIERS

We'll send you either of these:



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Sample case of actual magnifiers . . . over 50 types and sizes for you to try out on the job. They will be loaned on request to qualified firms. Folding magnifiers, loupes, bench-stand units, illuminated magnifiers are included.

Catalog 1-67

Our 24-page catalog pictures and describes dozens of magnifiers from folding pocket units to illuminated bench models. It tells you what to look for in selecting one, why a good lens is important, gives prices.

One of our industrial magnifiers may be just the answer to a production or inspection problem in your plant. But which one? That's why we offer to loan you the assortment so you can get the feel of them, see for yourself how well they work, get acquainted with possibilities.

BAUSCH & LOMB OPTICAL CO.
50410 Bausch St., Rochester 2, N. Y.

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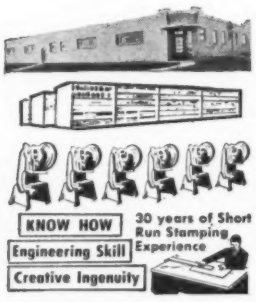
saves YOU time and money . . .



1. You send us your print, sketch or sample. It undergoes a complete analysis from the standpoint of materials, men, methods, machines and delivery. An analyzed quotation is promptly submitted without obligation to you.
2. Immediately upon receipt of your order, a Federal die is made for your stamping. Effecting a savings of up to 80% of permanent die cost.
3. Stampings are fabricated in our modern press department.
4. The average short run stamping order is delivered in four to five weeks' time. Orders are shipped the same day they are completed.
5. Your dies are carefully stored and maintained for your exclusive future use at your direction.

Be sure your next short run stampings are produced accurately, economically and quickly—send your print, sketch or sample for our . . .

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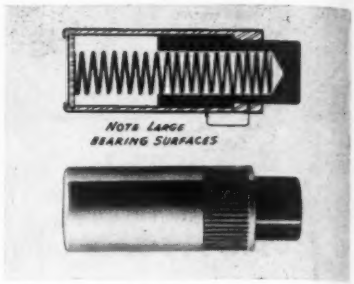
Quality Stampings in Small Quantities
3614 Alabama Ave., Minneapolis 16, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 2482

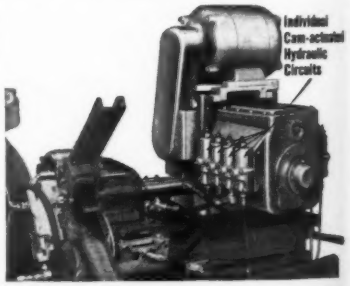
This Retractable Die Stop is a low cost, time saving stop pin for compound dies. The stop is ideal for stripper plates, draw rings, oil breakers and similar uses. Four body sizes are available ranging from ⅛" to ¼" body dia; ⅜" to 5/32", plunger



dia; ¼" to ⅛", retraction; and 1⅛" to ½", body length. End pressures range from approximately 3½ lbs to 1¼ lbs. Keystone Engineering and Mfg. Co., 122 S.W. 16th St., Des Moines, Iowa, or—
Circle Inform-A-Gram No. A46.

Cut Waste and Speed Production with shaped solder. Solder Microforms are available in rings, discs, pellets, drops, segments, foil, powder, washers, balls, rectangles and squares with or without flux. This method of soldering is ideal for production soldering by induction hot plate, oven or flame heating. Solder Microforms are available in alloys having melting points from 135°F to 1700°F. Anchor Metal Co., 244 Boerum St., Brooklyn 6, N. Y., or—
Circle Inform-A-Gram No. A47.

The Hydra-Cam is used for multiple circuit hydraulic power and sequence control. This device consists of a series of hydraulic power cylinders, each connected to an individual closed hydraulic circuit. By vary-



ing the characteristics of the individual cams, any timing and sequence or overlapping of motions is obtainable, as well as length of stroke. Cycles can be as fast as one/sec. Earl A. Thompson Mfg. Co., 1300 Hilton Rd., Ferndale, Mich., or—
Circle Inform-A-Gram No. A48.

PRECISION
drilling machine
— 5/8" capacity—

Designed for Those Jobs Where Accuracy is Important

FEATURES . . .

- Precision ball bearing spindle with minimum run out
- Accurate mounting of head and column to insure squareness of spindle to table
- Built-in gear drive for extra low speeds
- Convenient direct reading infinitely variable spindle speed control dial, together with a drill size, speed and material chart
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260 East Erie Street • Milwaukee 2, Wisconsin

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(Models 557 and 558)

- THE ULTIMATE IN RUGGED CONSTRUCTION
- completely replaceable parts
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- 4,000-lb. holding pressure
- weight of 4½ pounds!

(Model 558 is the same as Model 557, but with *upright handle!*)

Send for **FREE Literature** on these new DE-STA-CO Titans—Models 557 558!

DE-STA-CO **DETROIT STAMPING COMPANY**
WORLD'S FIRST LINE OF TOGGLE CLAMPS
344 Midland Avenue • Detroit 3, Michigan

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BORING
FACING
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SIX SIZES AVAILABLE

ALL HAVE POWER FEED FOR FACING

***A BORING HEAD THAT WON'T FACE IS NOT COMPLETE**

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COMBINED BORING & FACING TOOL HEADS
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Horberg **PIN GAGES** *drill sizes taper entry*

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- **Accurate to —.0001" —.0000"**
- **Concentric taper on lower half .001" smaller than gage size.**
- **Oil hardened tool steel — standard 1½" length.**

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Letter sets — 52 gages, A-Z in pairs
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Number sets — 120 gages, 1 to 60 in pairs
Individual gages in stock — extra stands available
All items stocked for immediate delivery

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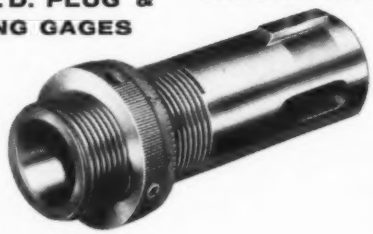

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Adjustable Adapter Sleeves and Nuts

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"Economy" stocks always complete to assure immediate delivery. Worn-out plugs and ring gages salvaged at low cost.

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Smoother Production! Higher Output! Lower Costs!

RICE-MILWAUKEE

DIE FILERS . . . for straight-line sharp corner filing, sawing and lapping.

This low cost precision-built unit performs all die making operations at savings up to 40%. Furnished complete with motor and two overarms. No extras to buy.

PROFILE GRINDERS

. . . for high speed Precision Grinding of Curved and Irregular Contours.

Standard features include 20,000 or 30,000 R.P.M., or a combination of these spindle speeds, ½ H.P. motor, Collet Chuck, Compound tilting table, built-in wheel dresser.

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RICE PUMP & MACHINE COMPANY

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IMPORTANT NOTICE

The Genuine MAUSER VERNIER CALIPER

IS NOW MADE OF STAINLESS STEEL THROUGHOUT

AND THE FOLLOWING IMPROVEMENTS HAVE BEEN ADDED

- HARDENED PHOSPHOR-BRONZE adjustable gib retains accuracy
- SPECIALLY LONG VERNIER to read thousandths
- 3 GRADUATIONS - 1/1000" - 1/128" 1/10 mm in back

$14.75 PPD

Request illustrated folder showing complete line of MAUSER Toolmakers Calipers, Height Gages, Bevel Protractors and Tool Stands.

GEORGE SCHERR CO., Inc.

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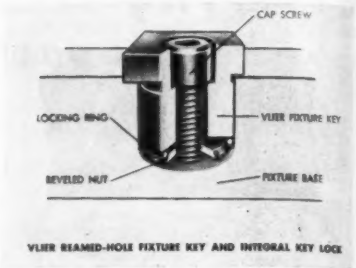
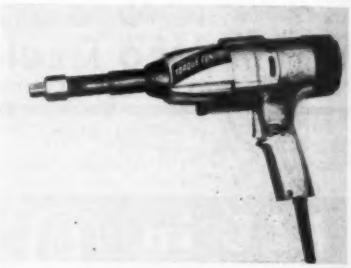
A Fixture Key Lock has been developed for securing Vlier fixture keys in the base without drilling and tapping a screw hole. After the fixture key is inserted into the reamed



VLIER REAMED-HOLE FIXTURE KEY AND INTEGRAL KEY LOCK

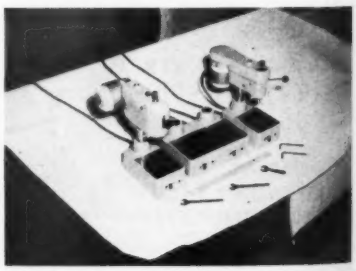
hole and the proper flat selected, a cap screw is tightened to draw the beveled nut into the lock ring. Vlier Engineering, Inc., 8900 Santa Monica Blvd., Los Angeles 46, or — **Circle Inform-A-Gram No. A49.**

"Torsion Bar" Torque Control Size 5UT Impactool runs down fastenings with great power and speed to a preset torque and then automatically shuts off. It has wide application wherever nuts, bolts, studs or screws must be run to precise torques. The

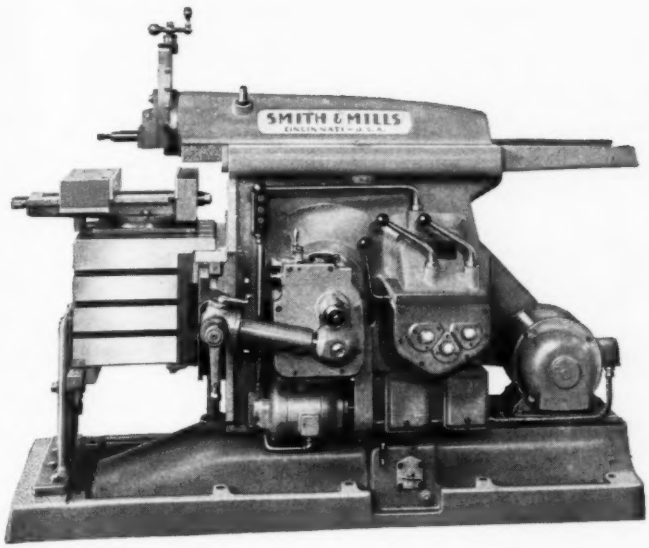


tool which is reversible, can be used as a conventional Impactool without the torsion bar. Two torsion bars are available giving a torque range from 20 to 90 ft lbs. Ingersoll-Rand Co., 11 Broadway, New York 4, or— **Circle Inform-A-Gram No. A50.**

Vibration-Free Sensitive Drill and Tapping Units have been developed by Haller Inc., 684 Ann Arbor Rd., Plymouth, Mich. The pulley and motor operate as an integral unit,



eliminating vibration. Maximum depth of hole for drilling is 25/32" and for tapping, 45/64". Drills and taps are accommodated in sizes up to 0.100" dia.
Circle Inform-A-Gram No. A51.



Bull ram gear, rocker arm and universal table trunnion made of ductile iron for extra rigidity.

SMITH & MILLS SHAPERS— for production and tool room

Compare Smith & Mills with any other shaper for versatility, speed, cutting power and precision performance. *Compare* and you'll *buy* Smith & Mills—famous for high quality shapers since 1888. Write or wire for prices, deliveries, repair parts or field service. Smith & Mills Shaper Division, Nebel Machine Tool Corp., 3401 Central Parkway, Cincinnati 25, Ohio.

Smith & Mills Shapers now available in Heavy Duty Models in 16″, 20″, 25″, 28″, 32″ and 36″ strokes, and Standard Duty Models in 20″ and 24″ strokes.

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CIRCLE INFORM-A-GRAM KEY NO. 2511

LUCAS TOTE PANS

HELP SOLVE PRODUCTION PROBLEMS!

Lucas Tote Pans are built for long wear and ease of handling. Designed for every shop use—storing materials, holding parts for convenient handling by machine operators and at assembly lines, Lucas Tote Pans are available in nesting type, stacking type, straight side and assembly or bench pans. Lengths from 10" to 32", widths from 5" to 23" in standard sizes. Other sizes made to your specifications.

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CIRCLE INFORM-A-GRAM KEY NO. 2512

Regardless of Cost..... You Can't Get A Better Variable Speed Transmission

Fractional to 5 hp. at 1750 rpm. Ratios to 10 to 1. Lever (shown) or handwheel control.

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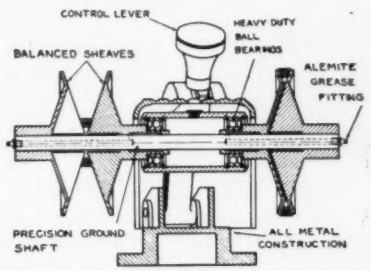
- Inexpensive compared to other infinitely variable speed transmissions.
- As easy to install as an ordinary V-Belt drive.
- Uses standard V-Belts.
- Infinitely variable over wide speed ratio up to 10:1.
- Changes speed quickly while machine is running.
- Compact—all metal—balanced sheaves—large ball bearings.
- Minimum wearing parts—no expensive replacements.
- Lubrication needed at only three points.



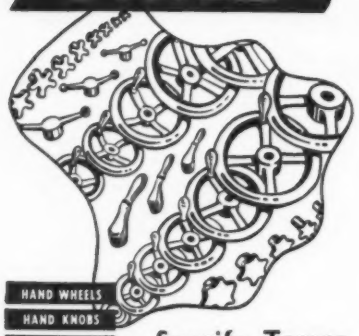
This cut-away sketch shows the practicality and simplicity of the Select-O-Speed's design. Nothing complicated, just two variable pitch sheaves mounted on a pivoted shaft. No internal mechanism—no intricate parts. Shifting the control lever causes a momentary variation in tension between the driving and driven belts which changes the sheave pitch diameters and the driven speed.

Get the facts about the Select-O-Speed. Tell us about your application. We'll give you our recommendations. Request Bulletin 118.

LOVEJOY FLEXIBLE COUPLING CO.
4819 W. Lake St., Chicago 44, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 2513

Tomco



HAND WHEELS
HAND KNOBS
MACHINE HANDLES
HANDLES
BALL HANDLES
SPECIALTIES

Specify Tomco for long lasting dependability

A complete line of high grade hand knobs, handles, and hand wheels is available from Tomco. Immediate shipments are made from stock of standard items. Specialty items are made to your specifications.

For original equipment or replacement parts look to Tomco for quality and service.

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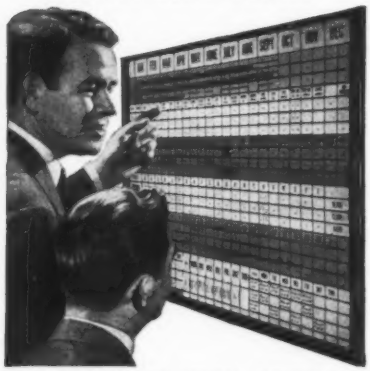
1623 DOUGLAS AVE.
RACINE, WISCONSIN

Blank or Machined—from stock
CIRCLE INFORM-A-GRAM KEY NO. 2521

How To Get Things Done Better And Faster



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new catalog 601...
FORD
cutting tools

12 pages packed full of data on Ford's complete line! Includes H. S. S. and Carbide Rotary Files and Cutters, Countersinks, Carbide End Mills, Grinding Burrs and special tools. Lists all styles, shapes and sizes in easy-to-read tables. Gives dimensions, angles, operating data. Concise descriptions. Illustrated throughout. Your handy reference book on Ford cutting tools. All ground tools are *precision machine ground* . . . tooth spacing is uniform and relief angles are constant on each tool . . . which means faster cutting, longer life, better finishes. Send in today.

Rotary FORD Tools

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YES, send me new free Catalog 601 and latest price sheet on Ford Cutting Tools.

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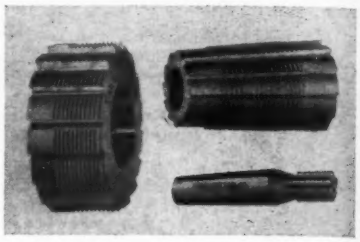
CITY ZONE STATE

CIRCLE INFORM-A-GRAM KEY NO. 2523

Load and Remove Dies from Inclined Presses with a new type of attachment. The table can be rotated 180° horizontally permitting loading and unloading from any angle or approach and can be tilted for positioning and retrieving dies in presses inclined up to 45°. The attachment can handle dies weighing up to 6000 lbs. Automatic Transportation Co., 149 W. 87th St., Chicago 20, or —
Circle Inform-A-Gram No. A52.

Accurate, Unground-Form Gear Hob Precision is a feature of a line of multiple-thread milling cutters. The Star-Process cutters are made in both shank and shell-type designs with a precision heat-treating proc-



ess. They can be had with special thread as well as standard straight, taper or pipe thread forms. Star Cutter Co., 34500 Grand River Ave., Farmington, Mich., or —
Circle Inform-A-Gram No. A53.

An Alkaline Burnishing Compound for zinc die castings has been introduced by Oakite Products, Inc., 157 Rector St., New York 6. FM 186 can be used for self-tumbling of the shot or synthetic media. It is also recommended for burnishing steel and copper and its alloys.
Circle Inform-A-Gram No. A54.

Position Coils on a slitting line for easy strapping in a horizontal position with this transfer mandrel and coil tilt table. The photo shows the machine after it has picked up a coil from the transfer mandrel and before it has been inverted on the

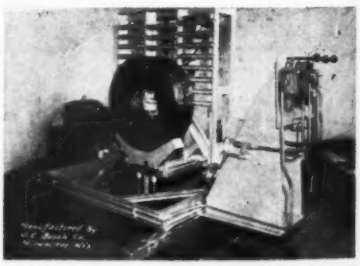
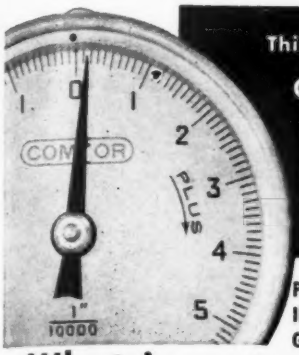


table. The transfer mandrel will handle up to 10,000 lbs/arm. The tilt table can be engineered to meet individual requirements. J. C. Busch Co., 158 S. Barclay St., Milwaukee 4, or —
Circle Inform-A-Gram No. A55.



This is the actual size of COMTORPLUG'S dial showing how easily you can read it to fractions of .0001".

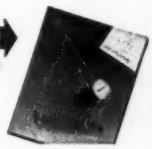
What is your gaging problem?

PRECISION INTERNAL GAGE
for holes ⅛" to 10" diameter.

Why not give Comtorplug a chance to solve it?

With a fixed — not passing — reading, Comtorplug shows the exact size of any part of a hole, detecting front or back tapers, ovality, bell mouth, etc. Can be used by anybody — no training program — no hoses, wires or electronic gear.

SEND FOR BULLETIN 49
It may help answer your problem



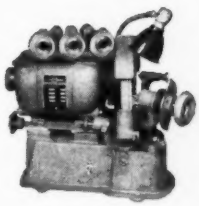
COMTOR COMPANY
82 FARWELL ST., WALTHAM 54, MASS.
CIRCLE INFORM-A-GRAM KEY NO. 2531

Now! Anyone can GRIND DRILLS

Quickly . . . . Accurately . . . . Easily

FOR DRILLS UP TO ¾" . . .

The BLACK DIAMOND Drill Grinder restores an old drill to like-new precision sharpness . . . in 10 seconds! Any inexperienced man (or woman!) is an expert grinder with this unit. Both lips ground at once . . . web-thinning equally simple! Pays for itself many times over!



FOR DRILLS UP TO 2½" . . .

The WORCESTER Drill Grinder (now manufactured by Black Diamond) sharpens 2, 3, or 4-lip drills, flat, flat twisted or chucking, up to 2½". Clearances are easily and instantly changeable, feeding is controlled by micrometer adjustment

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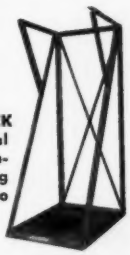
Time- and space-saving equipment of advance design . . . permits new economy, efficiency and handling ease . . . for every storage operation.

WAREHOUSE RACK
For storage of heaviest palletized loads — up to 4000 lbs. per shelf! No. WR-9



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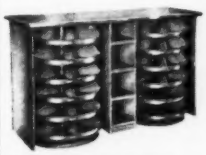
Permits vertical storage of conduit and tubing in lengths up to 10'.
No. ECR

BULK STORAGE RACK
Long-span (6') shelving handles lengthy packages or bulk loads.
No. BSR-247

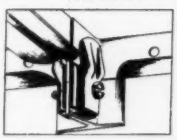


ROTABIN COUNTER
Permits finger-tip accessibility of many fast-moving small items. No. C-286-27-S

SERVICE CART
For moving small items quickly, safely in plant operation. No. SC-30

PALLET FRAME
Permits fast pallet stacking of irregular or crushable loads.
No. PF-44

ROTABINS
For broken package lots or large quantities of small items.



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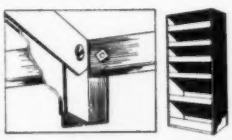
Installation is fast without tools . . . using simple clips.



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Offers a wide range of standard sizes, parts and accessories.

The FRICK-GALLAGHER MANUFACTURING CO.
WELLSTON, OHIO

Specialists in Storage Planning and Manufacturing of Storage Equipment

TELL ME MORE ABOUT STORAGE ECONOMY . . .
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CIRCLE INFORM-A-GRAM KEY NO. 2533

Flexolap... INSTANTLY AND ACCURATELY

ADJUSTABLE FOR FAST CUTTING AND POLISHING

...without danger of galling or seizing!

The Flexolap barrel is made with a series of longitudinal slots milled "off-center" to permit sensitively flexible expansion up to 15%—or more—under pressure of the adjusting pin. This construction enables Flexolap to save valuable time and to lap rounder, straighter holes. For accurate precision take-up, as desired, to maintain size and compensate for wear on barrel . . . simply turn adjustment screw.

Illustrated at left is Flexolap Set No. 1. Includes 6 complete laps, one of each size (3/16", ¼", 5/16", ⅜", 7/16" and ½"), and one additional brass barrel of each size, all held on a sturdy, serviceable stand. Price complete $14.00

Also available in sizes 7/32", 9/32", 11/32", 13/32", 15/32", 9/16", 5/8", 11/16" and 3/4". For lapping holes smaller than 3/16", use the Midget Lap. Seventeen sizes: .032, .036, .040, .046, .054, .062, .070, .079, .090, .104, .120, .135, .155, .170, .187, .218, and .250. Trial assortment (17 laps) $2.10

Write today for Catalog

FEDERAL TOOL CORP. 3600 Pratt Blvd., Chicago 45, U.S.A.

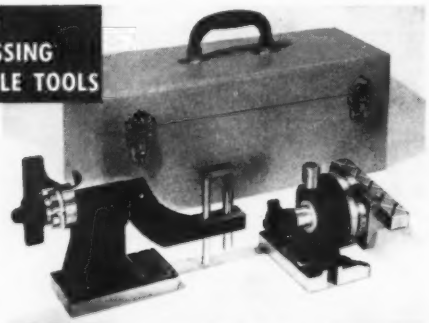
CIRCLE INFORM-A-GRAM KEY NO. 2541

Now ANGLE TANGENT TO RADIUS WHEEL DRESSING WITH NEW VERSATILE TOOLS

MIGHTY GOOD AT ANY PRICE BUT TOPS AT ONLY $149.50

(Both tools including diamonds)

The G-5 RADIUS DRESSER is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on a 7 inch or 10 inch wheel, and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal insures chatter free operation. The G-2 ANGLE DRESSER AND TOOL HOLDER is actually two tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2' of 1°; an excellent time saver to set up small jobs to be milled, drilled, tapped, etc., on any desired angle.



Our fixtures will dress most radii and angles tangent to each other, similar to those shown below.

FREE handsome, wooden storage box. Write for complete information.

Distributorship available in select territories.

ROTH FUSS TOOL COMPANY

BOX 22, ELMWOOD STATION **PROVIDENCE 7, R. I.**

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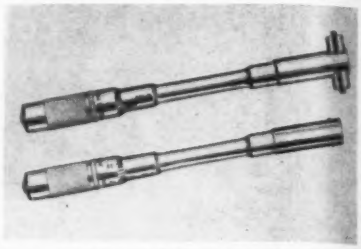
DYKEM STEEL BLUE
Stops Losses
making Dies and Templates
Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.
Write for sample on company letterhead
THE DYKEM COMPANY
2303L North 11th St. • St. Louis 6, Mo.
DYKEM STEEL BLUE
SPECIMEN
With DYKEM Steel Blue
Without DYKEM Steel Blue

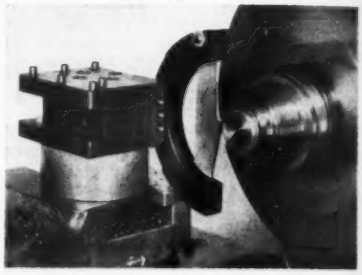
CIRCLE INFORM-A-GRAM KEY NO. 2543

A New Line of Small Diameter Inside Micrometers has been produced by Rimat Gage Co., 21 W. Dayton St., Pasadena, Calif. P and PX-Series have a wide variety of



ranges from 0.310" through 1.250". P-Series inside micrometers have gaging tips which are rectangular in cross-section for checking very thin grooves and recesses.
Circle Inform-A-Gram No. A56.

Savings in Cutting Time, Blade Replacement Costs and Power are realized with this Speedway cutoff tool assembly for lathes and automatic machines. The vertically hung blade completely eliminates tool



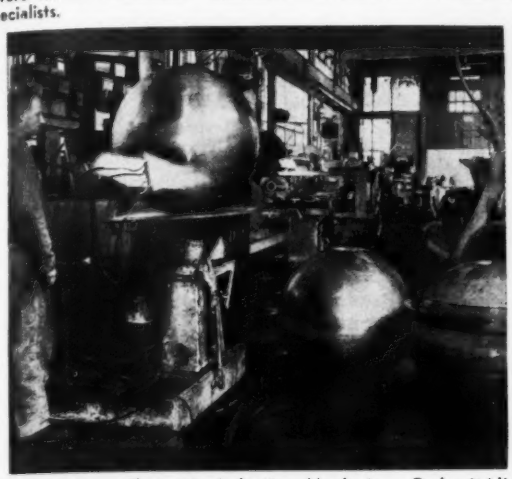
chatter. The tool is suited for work on blanks of all kinds and interrupted cuts on hex, octagon and square materials. Wye-Stanley Tool Co., 3503 E. Olympic Blvd., Los Angeles 23, or—
Circle Inform-A-Gram No. A57.

This Drafting Table features instant table height and top tilt adjustments. A standard piece of equipment is the sliding reference top attached to the back side of the table. The May-O-Matic table which

can be purchased in several combinations, has a height adjustment range of 9". Further information can be obtained from Mayline Co., 619 N. Commerce St., Sheboygan, Wis., or—
Circle Inform-A-Gram No. A58.

R for WEAR RESISTANCE

Here at Lakeside Steel Improvement we have the facilities and expert know-how to handle all flame hardening jobs — from two ton balls to intricate cams and gears. Our method of flame hardening assures your parts of increased wear resistance even under the most severe service conditions. Remember — it costs less to deal with specialists.



Our Services: Electronic Induction Hardening, Carbonitriding, Flame Hardening, Heat Treating, Bar Stock Treating and Straightening (mill lengths and sizes), Annealing, Stress Relieving, Normalizing, Pack, Gas or Liquid Carburizing, Nitriding, Speed Nitriding, Aerocasing, Chapmanizing, Cyaniding, Sand Blasting. Laboratory Physical Testing.

THE *Lakeside Steel Improvement Co.*

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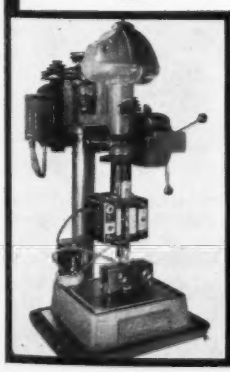
CIRCLE INFORM-A-GRAM KEY NO. 2551

Commander LEAD-MATIC *Tapper*

Automatic Tapper with Lead Screw

FOR HIGH PRODUCTION PRECISION TAPPING

- Precision Ground Lead Screws Assure Finest Threads
- Electrically Controlled Cycle or Jog Tapping Action
- Hand, Foot or Fixture Switch Control
- Easily Adapted to Any Drill Press
- Range #0 to ¾"



Built for high production tapping . . . precision or otherwise, the Commander Lead-Matic Tapper makes any drill press a precision tapping unit, even with inexperienced operators. Electric control of Cycle or Jog tapping action provides versatility to handle any job . . . automatic tap reversal eliminates drill press motor reversing and speeds tapping. Compact, ruggedly built, easy to operate, the Commander Lead-Matic Tapper will cut your tapping costs and reduce rejects to a minimum.

Write for illustrated circular and name of nearest Distributor.

Commander MFG. CO.

4228 W. KINZIE ST. • CHICAGO

PRODUCT OF COMMANDER BUILDER OF PRODUCTION TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 2552

HIGHER SPEEDS! FASTER GRINDING!

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AIR GRINDERS

Model JA
50,000 R.P.M.
$42.00
IN U.S.A.

Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

kipp

MADISON-KIPP CORP.

212 Waubesa St. • Madison 10, Wis., U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 2553

SPECIFY TOP QUALITY

DE-STA-CO

ARBOR SPACERS SHIMS and SPACING COLLARS • Arbor Spacers and Shims in 20 sizes and thicknesses from .001" to .125". Arbor Spacers furnished with standard keyway; Shims, with no keyway. Also Spacing Collars in numerous popular diameters, and in thicknesses from ⅛" to 3". Hardened and ground; edges chamfered. Furnished with standard keyway.

FEELER STOCK • Made from tempered stock, rolled to close tolerances, ½" x 25' coils packaged in transparent plastic boxes, except above .020". Strips ½" x 12", in cellophane. 27 thicknesses. All thicknesses from .001" to .032". (For use in precision fitting, checking clearances, inspection and production work.)

SHIM STOCK • Steel or brass. Selected from material rolled to precision limits, free from burrs, and protected by oil coating. Coils packed in carton for easy dispensing and protection. 15 thicknesses, .001" to .032". Sheets 6" x 12"; coils 6" x 120". Available also in two assortment packages —12 thicknesses, .001" to .015", and 15 thicknesses, .001" to .032".

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DETROIT STAMPING CO.

350 MIDLAND AVE. • DETROIT 3, MICH.

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ACCURATE INSPECTION TOOLS

Accuracy of measurement depends on the precision of the measuring tools. Provide your Shop and Inspection Department with dependable and proper inspection tools. MEEHANITE METAL TOOLS, made to close tolerances, are furnished in many types.

Surface Plates — Box Parallels
Slotted Angle Plates
Universal Right Angles
Flat Parallels — Lapping Plates
Toolmaker's Knees — "V" Blocks
Straight Edges (Bridge Type)
Straight Edges (Leveling Type)
Measuring Irons
Masterangle Plates
Angle Attachments

SURFACE PLATES RESCRAPED

ACME TOOL CO.

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CIRCLE INFORM-A-GRAM KEY NO. 2562

Precision-Made

FIXTURE CLAMPS & DETAILS

Heat-treated and Corrosion Resistant

QUICK SERVICE

CATALOG AVAILABLE

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Telephone KEnwood 3 7799

CIRCLE INFORM-A-GRAM KEY NO. 2563

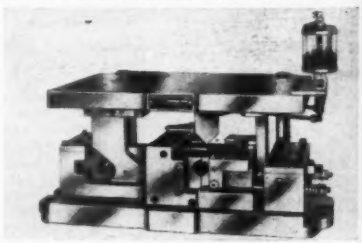
Ease of Operation, Speed, Sensitivity and Dependability are features of the Air-Grip clutches produced by Dodge Mfg. Corp., Mishawaka, Ind. They have finger-tip control and built-in quick release valves. The clutches operate at air pressures up to 140 psi. These clutches are available from stock in single and double plate types. For details, contact the company, or —
Circle Inform-A-Gram No. A59.

Bore Any Size Hole From 5/32" to 5" with a new boring chuck set introduced by Moore Special Tool Co., Inc., 740 Union Ave., Bridgeport 7, Conn. The set is designed for use

with Moore jig borers. Appropriate shank adapters permit its use with all machines with No. 40 taper and Bridgeport millers.
Circle Inform-A-Gram No. A60.

A Light Machining and General Purpose Grinding Compound has been developed by Park Chemical Co., 8074 Military Ave., Detroit 4. Blue Ice which can be used on all common metals and alloys, provides excellent rust proofing. It is odorless, fire-proof in storage, completely transparent and not damaged by freezing.
Circle Inform-A-Gram No. A61.

Shear Off Pipe and Tubing in accurate lengths of ½" or more to within ±0.010" with this new tube cutoff unit. Depending on length and wall thickness, approximately 1000 to 2000 pieces of pipe or tubing can be handled/hr. All blades and



blocks are interchangeable and can be obtained in any size or diameter within the range of the tool. The cutoff unit is made in 3 standard sizes. Vogel Tool & Die Corp., 1825-8 N. 32nd Ave., Melrose Park, Ill., or —
Circle Inform-A-Gram No. A62.

For Heat Treating Small Parts

HUPPERT

Deluxe

ELECTRIC FURNACES

Write today for literature on complete line of Huppert furnaces and ovens in floor and bench models. Ask for Hints on Heat Treating.

● Here's a series of compact durable furnaces that are ideal for tools and die shops and small laboratories. Any desired temperature within the range of 300° to 1900° F. is controlled by an accurate, built-in Huppert temperature controller. All-steel construction — multi-insulation — sturdy Kanthal elements — counterweighted doors — removable porcelain tray.

Model No.	Inside Dimensions			Temp. Range	Watts 110 Volts AC	Price
	Wide	High	Deep			
434DL	4¼"	3⅝"	4¾"	300°—1600° F.	920	$ 86.00
439DL	4¼"	3⅝"	9"	300°—1600° F.	1650	115.00
436DL	4⅝"	3¾"	6"	300°—1900° F.	1650	115.00
5DL	4⅝"	3¾"	9"	300°—1900° F.	1750	176.00
9DL	6"	6"	6"	300°—1900° F.	2200	200.00
669DL	6"	6"	9"	300°—1900° F.	3000	248.00
10DL	8"	4"	6"	300°—1900° F.	2000	220.00
849DL	8"	4"	9"	300°—1900° F.	3000	265.00

Available for 220 Volt AC at small additional cost.
Stainless steel housing slightly higher.

K. H. HUPPERT CO.

6820 Cottage Grove Avenue, Chicago 37, Illinois
Manufacturers of Electric Furnaces and Ovens

CIRCLE INFORM-A-GRAM KEY NO. 2571

ONE Clark LATHE TOOL HOLDER Grips 3 bit shapes

Square Bits

Round Bits

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Many Bit Sizes!

Clark LATHE TOOL HOLDERS do the *USUAL* and *UNUSUAL* JOBS BETTER IN EVERY SHOP—*SOLIDLY GRIP* ROUND, SQUARE and RECTANGULAR SHAPES—Enable turning, threading, boring with bars as well as cut-off operations with *ONE* tool holder!

Special vee clamp operating on diagonal accommodates several bit sizes, grips *full length of the cutter channel.* Holds bits tighter, eliminates chatter and harmonic vibration. Excellent rigidity for carbide tools!

4 Clark Lathe TOOL HOLDER SIZES cover complete range of lathe requirements from ⅛" bits to ⅝" bits. Write for prices or order from your dealer.

Robert H. Clark Company
9330 Santa Monica Blvd., Beverly Hills, California

CIRCLE INFORM-A-GRAM KEY NO. 2572

ELIMINATE a Complete Operation!

BURR-BIT PATENT PENDING

DE-BURRS TAPPED HOLE WHILE TAPPING

- FAST
- EASY
- PRECISE

- SAVES TIME
- SAVES LABOR
- SAVES MONEY

DE-BURRING WHILE TAPPING
By merely slipping a BURR-BIT on your tap in a matter of seconds, a complete secondary operation is eliminated. Designed to fit all makes of taps.

ELIMINATE A SPINDLE
Save the wasted cost of an extra machine, extra floor space, extra manpower, extra engineering.

GET A PERFECTLY CLEAN HOLE
Since the BURR-BIT removes the burr while the tap is being withdrawn from the hole, the BURR-BIT leaves a smooth finish and removes only the first thread which creates the burr. Does not push the burr back into the hole to spoil the lead of the thread. Permits easy screw insertion.

DE-BURR THIN MATERIAL
The BURR-BIT creates a chamfer just deep enough to remove the burr and does not spoil the few remaining threads. It gives a smooth, flat surface to the workpiece.

CAN BE EFFICIENTLY USED ON PRACTICALLY ALL MATERIALS—STEEL, ALUMINUM, PLASTICS, ETC.

MADE PRESENTLY TO FIT ALL TWO AND FOUR FLUTED TAPS FROM #2 TO 3/8 in IN ALL PITCHES. AVAILABLE FOR THREE FLUTED TAPS ON SPECIAL ORDER.

BLADES MADE EXTRA LONG TO ENABLE RESHARPENING MANY TIMES.

THE SENSATIONAL BURR-BIT IS A HIGHLY PRECISE PRODUCT MADE OF THE FINEST QUALITY HIGH SPEED STEEL, INDIVIDUALLY INSPECTED. ***Dealers Inquiries Invited!***

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The Most Economical Method

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VERNON DEVICES, INC. TP-10
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Please send me full information and specifications on the BURR-BIT.

Your Name .....
Company Name .....
Address .....
City..... State.....

CIRCLE INFORM-A-GRAM KEY NO. 2573

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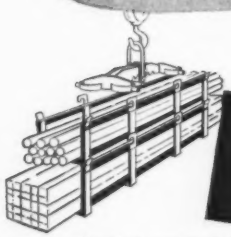
Increase Storage Efficiency
Save Time, Save Labor, Cut Costs

Jarke "Mini-Module" prefabricated storage racks give you storage when you want it, where you want it. Temporary or permanent. Simple to set up or take down, no bolts, no tools, no fittings. Special "nesting" caps provide fast stacking and insure rigid, no-slip interlocking tiers. Lightweight, easy to handle. Sturdy steel construction.

WIRE COIL RACKS

For stacking coiled material. Four-way entry for fork truck, open ends for ram-type deposit of coils. Nesting caps insure fast easy stacking.



For safer stock transport. Unique crane grab permits load centering and rapid fool-proof engagement. Automatic grab also available.

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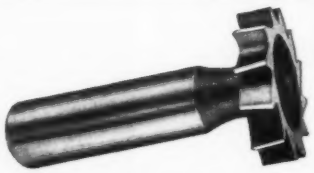
5407 N. Broadway Chicago 40, Illinois
Manufacturers of Portable Storage Racks, Steelmobile, Scrapmobile

CIRCLE INFORM-A-GRAM KEY NO. 2581



STAGGER TOOTH WOODRUFF CUTTERS

- STANDARD STOCK ITEM
- STANDARD PRICES
- SMOOTHER CUTTING
- LONGER LIFE

Recommended for cutting tough, hard to machine materials.

Agents' and Jobbers' Inquiries Welcome

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Empire

LIVE CENTERS

ARE
- ACCURATE
- VERSATILE
- HEAVY DUTY

Manufactured in all tapers. 1 to 6 MT in stock. Special shanks and points made to order.

THE TAPERED SEAT ASSURES ACCURACY OF ±.0001

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Points illustrated are standard.

Ask your Supplier or Write for Literature

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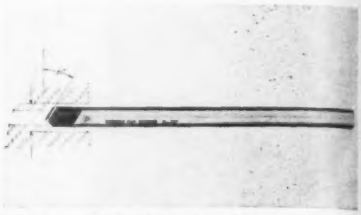
MAGNIFIES "HARD-TO-READ" VERNIER SCALES ON HEIGHT GAGES AND CALIPERS

MAGNIFIES the "hard to read" vernier scales on calipers and height gages. No more eye strain, guess work or hit or miss setting and reading. **LENS** is finest quality optical glass, specially designed and ground for the purpose with utmost optical skill. 4X magnification shows lines true and correct. In daily use in plants of Westinghouse, General Electric, General Motors, Chrysler, Packard, Ford, Boeing Aircraft, Bendix Aviation and many others engaged in defense work.
Made in 3 sizes to fit Starrett, Brown & Sharpe, Lufkin Tools, and others of similar design. S No. 100 for 6" Vernier Calipers; S No. 200 for 10"-12" Height Gages, also 10"-18"-24" Vernier Calipers; S No. 300 for most popular type 18" and 24" Height Gages and for 36"-48" 60" and 72" Calipers.
For Complete Information Write, Phone or Wire

STEBAR COMPANY
215-221 28th Ave. North Minneapolis 11, Minn.

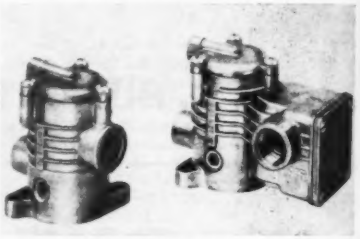
CIRCLE INFORM-A-GRAM KEY NO. 2584

30° Lathe Boring Bars have been designed for through hole boring and boring to a shoulder. They feature mechanically-clamped tool bits that allow the use of either HSS or



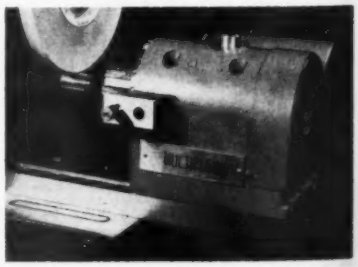
solid carbide bits in the same bar. The bars are manufactured in diameters from ⅜" to 1½". Everede Tool Co., Dept. 147, 2000 N. Parkside Ave., Chicago 39, or —
Circle Inform-A-Gram No. A63.

Capable of Controlling Over 600 Cycles/Min is a line of small solenoid pilot valves for handling air, vacuum, oil, water and inert gases. Available in 2 and 3-way types, the valves are designed for control of Speed King remote pilot operated

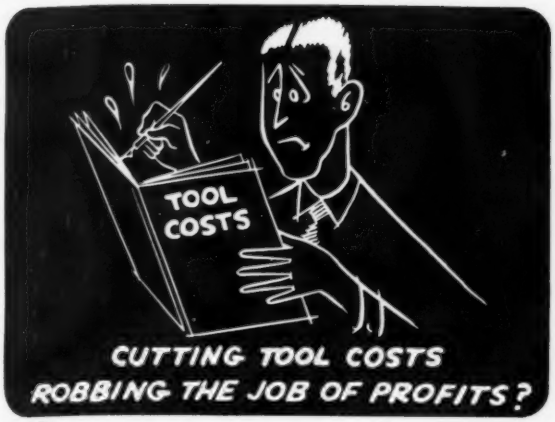


valves or direct control of small cylinders and similar devices. Capacities range up to 23.8 cfm air and 3.8 gpm hydraulic. For details, see Bulletin PB issued by Valvair Corp., 454 Morgan Ave., Akron 11, O., or—
Circle Inform-A-Gram No. A64.

Work Can Be Positioned on a grinding machine table and rotated by a motor drive with this new indexing head. Workpieces can also be indexed manually for milling, drilling and boring operations. The head is equipped with collets rang-



ing from ¼" to 1" and interchangeable 4-in three-jaw chuck. Motor and spindle are assembled on a common base for application vertically or horizontally. Multiplex Co., 1536 Getty St., Muskegon, Mich., or —
Circle Inform-A-Gram No. A65.

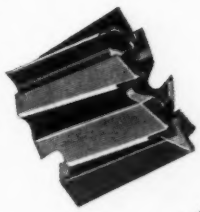


Systematic "NTS" salvage is the best way to cut cutting tool costs

Stop before you discard a worn or damaged cutter. It may be worth many times its scrap value!

Since 1912 we have been restoring all kinds of cutting tools to new usefulness to help shops control their cutter costs.

Can we assist you in studying your operations and tool usage to determine if a salvage program will save money in your plant? There is no obligation.



Write for this catalog and the salvage story.

NATIONAL NTS TOOL SALVAGE

NATIONAL TOOL SALVAGE CO.
6511 EPWORTH BOULEVARD DETROIT 10 MICHIGAN

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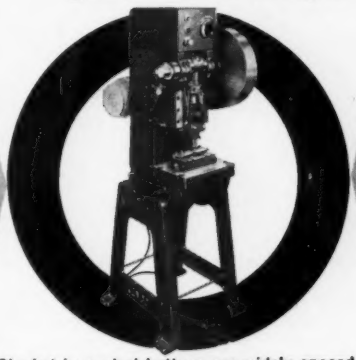
KENCO 15-ton ELECTRO-SAFE – the safest punch press you can buy!



Single-trip control buttons are widely spaced, to keep hands clear of the danger zone. Operator must push **both** buttons at once... hold them until stroke reaches bottom, then release both buttons to start new cycle. Fail-safe operation. Impossible to "fudge." Impossible for press to double trip.

VERSATILE CONTROLS—You can change from "single trip" to "continuous stroke," or "inching" by merely turning a dial. You can change timing in seconds. No flywheel... no clutching. Write for details.

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IMPROVES YOUR PRODUCT'S QUALITY...SAVES YOU TIME AND MONEY...

- **JUST SET YOUR TORQUE** Jomi automatically cuts out at the exact tension needed!
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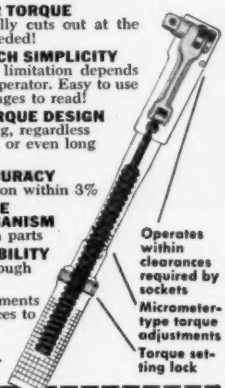
▶ for torque requirements from 10 inch-ounces to 2000 foot-pounds

▶ designed to meet specifications MIL-H-4034A (USAF)



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"Industry's House of Torque"

Please send me Jomi's Torque Wrench Catalog No. 22
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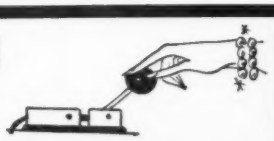
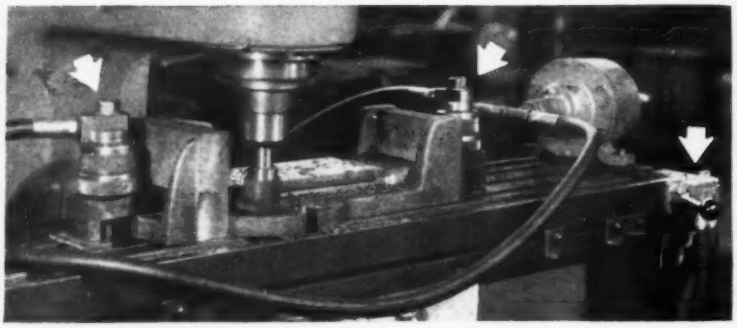
PowRlock gives this hand a 6000 lb. GRIP!





PowRlock AIR-HYDRAULIC CLAMPS provide instant automatic clamping on most existing machines and fixtures. Eliminate nuts, bolts, manual tightening, slash "reloading" time. Hydraulic pressure in the head activates a piston, which exerts up to 6000 lbs. locking force at one to 4 points. Comes complete with air-hydraulic system in 14 models. UNCONDITIONALLY GUARANTEED!

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The old way
(lathe grinder)

plus vibration, belt slippage & belt wear!

. . . in one powerful electric unit, easily mounted, with variable speed control!

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Power Quill is a new name fo. a new tool that outperforms and outlasts lathe grinders, and saves fortunes through increased tooling versatility! Precise Super 60 Power Quills are unlimited in application, can be used on any machine and mounted in any position to mill, grind, finish, or micro-mill any material with abrasive wheels and tungsten carbide tools. And look at these exclusive Power Quill features:

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Grinder-Millers - Power Quills - High RPM Milling Machines - Mounts and Accessories - Rotary Tools

Precise

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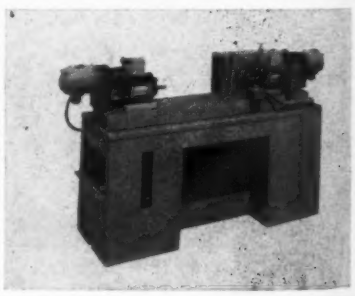
A New Line of Solid Tungsten Carbide Pusher Pads has been announced by Benco Collet Mfg. Co., Cleveland 14. They are designed for use on Model A master pushers produced by the firm. These pusher pads have a life expectancy of more than 30 times that of steel pads. Their bearing surface is non-scratching, non-wearing and non-galling. For details, see Bulletin CP-156 made available by the company, or — **Circle Inform-A-Gram No. A66.**

An Adjustable Vise Stop makes it possible to machine many pieces rapidly to the same dimension, after

the machine is set for the first piece. The vise stop holds 0.0002" tolerances on hole location. Glover Mfg. Co., Meadville, Pa., or — **Circle Inform-A-Gram No. A67.**

An Expanded Line of watertight heavy duty machine tool limit switches has been introduced by R. B. Denison Mfg. Co., 102 St. Clair Ave., N.W., Cleveland 13. The Lox-switch limit switches will stand up under severe machine tool operating conditions including large quantities of oil, dust and water. The switches are available in seven different models, with 19 various contact arrangements, 150 different lever styles and optional mountings. **Circle Inform-A-Gram No. A68.**

This Double-End Machine is a standard production machine that performs special machine operations such as drilling, tapping and other end-cutting tool operations. It incorporates two Model 24 Holomatic

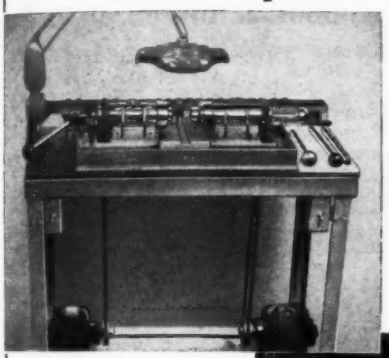


drill units. Spindle speeds from 190 to 10,000 rpm are available. The maximum stroke length/unit is 4". Hause Engineering, Montpelier, O., or—**Circle Inform-A-Gram No. A69.**

NOW POSSIBLE!

CONSECUTIVE OPERATIONS WITH MULTIPLE TOOLING -

Without removing workpiece from work spindle



JEDCO MICRO-DRILLING MACHINE

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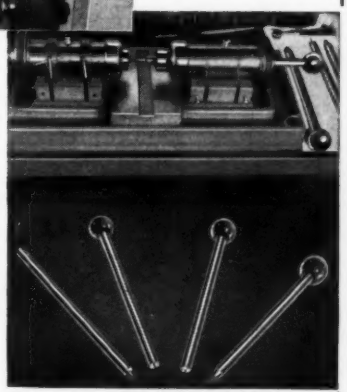

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OR . . . with suitable attachments, another model can be used to drill holes on rectangular coordinates to an accuracy of plus or minus .0005.

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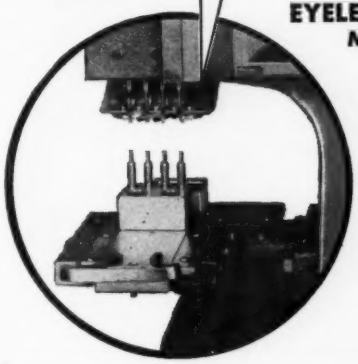

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For better machine performance set your machines level and keep them level! That's the key to increased production with less maintenance! EMPCO Leveling Jacks provide a solid, adjustable support for machine tools, large surface plates, tool room, and production equipment of all types. Easily installed and located, EMPCO Jacks keep your equipment level and stable—keep maintenance at a minimum.

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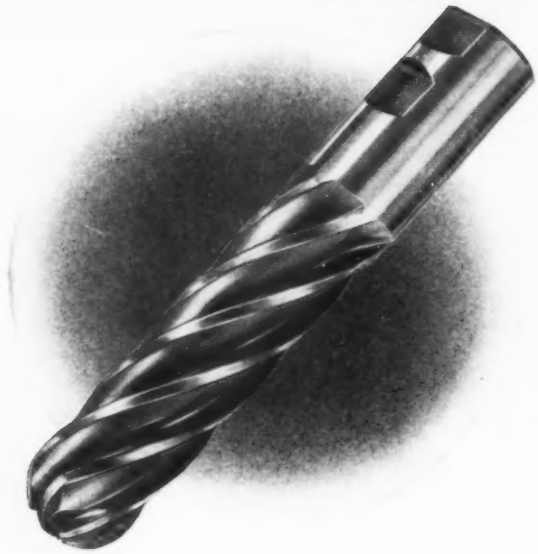

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BALL END MILLS

• These ball end mills for use on automatically controlled duplicating equipment are now available in 32 stock sizes. They are also for use on conventional milling or die sinking machines.

Weldon standard holders accommodate all sizes.

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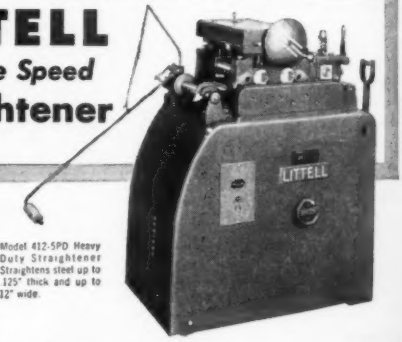
straighten coil stock as you feed it with a

LITTELL Variable Speed Straightener



Model 412-SPD Heavy Duty Straightener Straightens steel up to .125" thick and up to 12" wide.

A Littell straightener removes the curvature from coil stock. The press, slitter or shear receives a continuous strip of pre-straightened stock. Equipped with variable speed transmissions, Littell Straighteners are adjustable to meet a wide range of speed requirements in automatic feeding. They also simplify hand feeding. A variety of medium and heavy duty models straighten coil stock of all standard widths and thickness.

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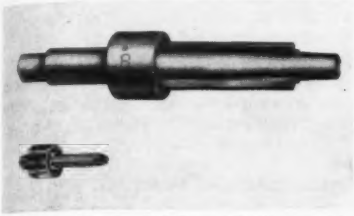
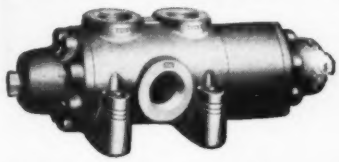
An Extra Long Bearing Surface over a wide bore range is provided by the Count-Centric expanding mandrel with straight jaws. The permanent jaws maintain built-in precision to 0.0005" T.I.R. for Type B



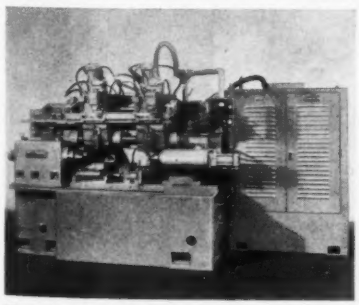
and to 0.0002" T.I.R. with Type SB. A miniature duplicate of the Count-Centric mandrel is Type M and SM Micro-Mite expanding mandrel. The Le Count Tool Works, Inc., 390 Capitol Ave., Hartford, Conn., or —
Circle Inform-A-Gram No. A70.

Designed for 1500 Psi Pressure is this hydraulic 4-way valve, air pressure operated by air pilot valve. An example of the hydraulic valve's uses is an automatic reciprocating circuit for controlled feed of machine table.



Model 5950 is available in standard action, spring-return and spring-centered. It features a floating piston design. For further details, obtain Catalog 204 from Rivett, Inc., Brighton 35, Boston, or —
Circle Inform-A-Gram No. A71.

A New Automatic Production Lathe is now being offered by Reed-Prentice Corp., Worcester 4, Mass. The Reedmatic lathe is available in two models, C-30 and C-60, arranged for either mechanical or hydraulic feeds to the turning and facing slides.



The longitudinal turning slide is mounted to a rigidly constructed top bed, leaving the entire front of the machine open for unobstructed chip drop and facilitating loading and unloading.
Circle Inform-A-Gram No. A72.

new! ALINA
DRILL GRINDER
set-up and sharpen
small drills
in 30 seconds

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- Sharpens drills from .012" to .250" with only two chucks
- No skill required
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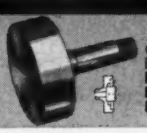
3AT, 3C, 1A, 4C, 5C

480 (AC-50) PUSH TYPE. All collets in hexagon, square and round for lathes, milling machines, attachments.



KLUTCH-KOLLET Step collet. Accurate chucking to 2¼" dia. Soft head for easy boring. Lowest price on market! Models 3AT, 3C, 5C.

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Positive grip on undersize, oversize or standard diameter work. Patented coordinate cams eliminate fingers.
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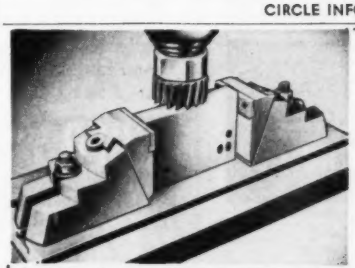

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ALORIS "Quick Change"
patented
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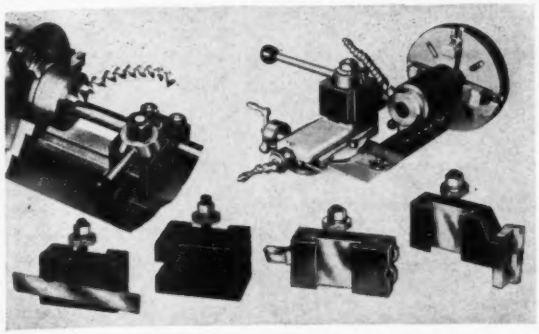

Only a second to change tools for turning, facing, drilling, boring, threading, knurling, cutting off or any other operation.

- Great Repetitive Accuracy
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- Greater Rigidity
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Available with or without Gripco locking feature. Three weld projections on bottom of nut provide a firm non-rocking electrical connection during welding. Write for samples and full details today.

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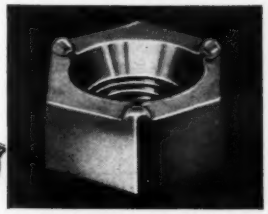
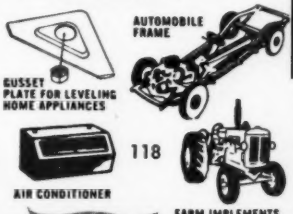


Gripco Countersunk Weld Nut eliminates time-wasting retapping of nuts after welding. Exclusive countersunk nut bottom eliminates fouling of threads by weld spatter. No time wasting false starts, no cleaning of damaged threads, nut ready to receive bolt immediately.



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Patented "head of the grain" finishing process gives added assurance of retained accuracy through years of use.

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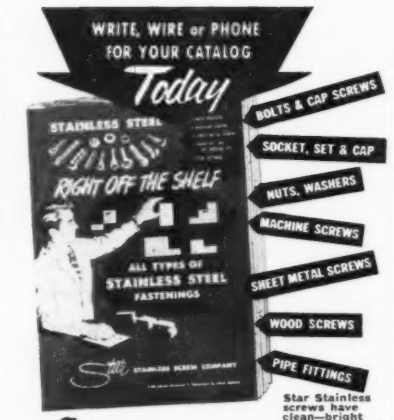

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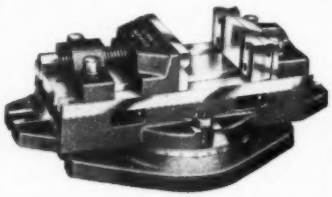

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Here's an accurate machine shop vise that will give you years of hard service. Hardened and ground parts make it impossible to destroy vise by milling or drilling into jaws or body. Sold with or without swivel shown, or plain with ground sides. Write for Bulletin TE2-104.

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YOU NEED THIS TOOL EVERY TIME YOU USE A DRILL CHUCK or BORING HEAD in a VERTICAL MILL, HORIZONTAL MILL or JIG BORER, if the hole is located from a surface that has been machined.

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- LOCATES FROM FLAT OR ROUND SURFACE.
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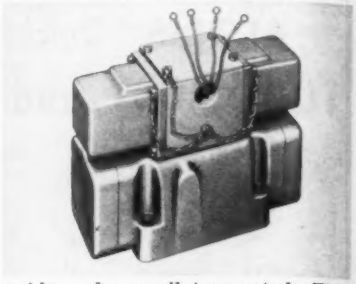
Operating Pressures to 3000 Psi are a feature of a new line of hydraulic control valves. Logan 9700 Series designed to meet JIC specifications, have continuous-duty sole-

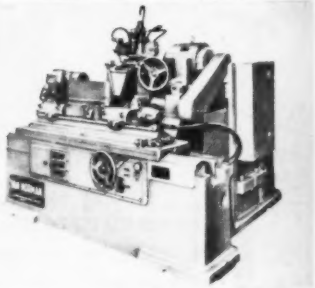


noids and are pilot-operated. They have a range of sizes from ⅛" to 1¼". For details, see Catalog 200, Sec. 7, provided by Logansport Machine Co., Inc., Logansport, Ind., or— **Circle Inform-A-Gram No. A76.**

Wide Ranges, Extra Sensitivity and Faster, Longer-Life Relays are features of 4950 Series of high-frequency carrier-operated proximity transducer systems. They can detect the presence of metal objects at twice the maximum range of the

4900 systems, without contact, for counting, controlling motors or valves, etc. Two systems, 4950-B and 4950-RB, are available. Electro Products Laboratories, 4500 N. Ravenswood Ave., Chicago 40, or— **Circle Inform-A-Gram No. A77.**

Increase Production, Save Time and Cut Costs with the Bowgage production grinder. Model 4B61 has gaging, rough and finish feeds, and an automatic cycle with rapid traverse. This unit will grind diame-



ters, tapers, shoulders, etc. to close tolerance, automatically. The maximum swing over the table is 10" and the maximum diameter to be ground is 6". Van Norman Machine Co., Springfield 7, Mass., or— **Circle Inform-A-Gram No. A78.**

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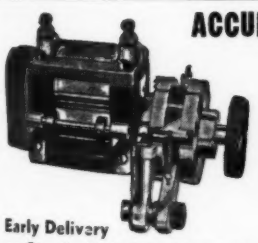

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Models to fit:
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FOR STOCK UP TO 12" WIDE

Early Delivery on Standard Models

"RFC" ROLL FEEDS are quality built for long dependable service.

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NEW AUTOMATIC CONTROL *Trippit* PAT. PEND.

Increases Production, Safety of Power Presses, Shears and Brakes

HAND FED OPERATIONS BECOME SEMI-AUTOMATIC

Production Automatic tripping by piece part—automatic gauging—eliminates rejects—prevents die damage—shuts off after pre-set count—counts electrically—protects all operations in automatic set-ups. Automatic tripping and gauging features completely eliminate operator error, nesting and tripping time.

Safety Two-hand safety trip (approved) and quick change foot pedal included. Single stroke or repeat selection.

No alteration of machine needed—installed in one hour. Low cost—complete.

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Designers of low-cost, automatic production and safety devices.

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CUT A KEYWAY FOR ONE CENT

Using a Minute Man Keyway Broach Kit, you can cut keyways for as little as a penny a piece in just one minute. For keyways from 1/16" to 1" in any bore from 1/4" to 3".

Minute Man **Broaches for square and hexagonal holes and Production Type Keyway Broaches are also available from stock at your Industrial Distributor's.**

GET ALL THE DOPE

The duMONT CORPORATION, Greenfield, Mass.

MAIL FREE BROACH CATALOG AND PRICE LIST TP describing Square Broaches, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to

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CAST IRON HAND WHEELS

Solid Web and Counter Balanced. Made of fine grain cast iron. Center hole and faces of hub are true to rim. Rims and handles are ground and polished to high lustre. Adds distinction to product. Top quality. Low prices. Many sizes. Immediate delivery. Alterations when required at nominal prices.

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— Except Screw Machine Cams —

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The editorial index is on Page 78. The advertisers' index is on page 272.

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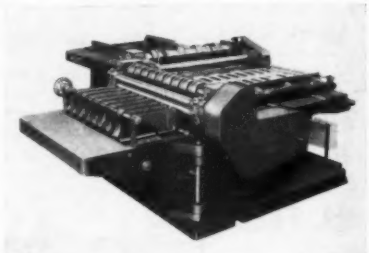
Reprints and Technical Books are described and priced on pages 64, 156 and 198.

CURIOUS?

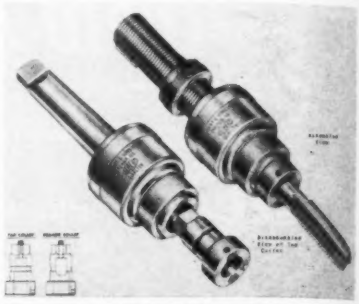
Your Inform-A-Gram Card is on Page 140.1. Just fill in and mail. Further information will be sent to you about the items you select.

An Automatic Duplex Trimmer and Slitter for high speed can lines has been developed. Model 5225 which is a two-unit machine mounted on a common base and driven in unison by a geared-head motor, features speeds ranging from 30 to 70 sheets/min. The cutters



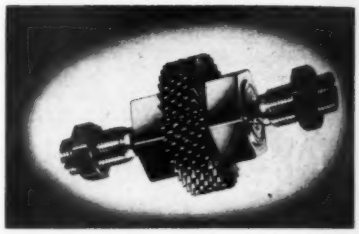
can be sharpened in place. The bearing housings can be removed without dismantling the rest of the slitter. Model 5225 is shown arranged as a high speed body blank slitter. For further information, write to E. W. Bliss Co., 50 Church St., New York 7, or — **Circle Inform-A-Gram No. A79.**

Quick, Easy Tool Changes without the use of wrenches are possible with a new roller-type floating tool holder. The holder features extra bearing capacity to withstand heavier thrust loads and an interchangeable collet. An internal adjusting



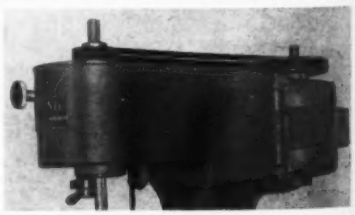
set screw behind the collet permits presetting the cutting tool. Two types of collets are provided — one for taps and one for reamers. Seibert and Sons, Inc., Chenoa, Ill., or—**Circle Inform-A-Gram No. A80.**

Better Dresser Performance at Lower Cost is possible with the "Wise" dresser cutter assembly. It picks, instead of crushes, the surface of the abrasive disc. Pictured is the standard type cutter assembly made



up of six wheels with all fine teeth. Also available is Type A with alternate fine and broad tooth construction. The dresser cutter features a "tru-square" arbor. Besly-Welles Corp., So. Beloit, Ill., or— **Circle Inform-A-Gram No. A81.**

A New Type Drive for Model 2F drilling machine has been announced by Edlund Machinery Co., Cortland, N. Y. Model 2FV production drives are designed for long production runs at one or several pre-selected



speeds. The single speed drive is shown and a five-speed drive is available. Both can be converted to the infinitely variable speed drive of the Model 2F drilling and tapping machine.
Circle Inform-A-Gram No. A82.

tap more

Accurate

pieces per hour

with a PROCUNIER TAPPING HEAD!

There's an *extra quality* built into each Procunier tapping head that is automatically reflected in the work produced. They are *precision* units — with the most advanced engineering improvements. In shop after shop — the reaction is the same — "Procunier heads are producing *better, faster, longer,* with *fewer* rejects, *fewer* spoiled pieces".

Procunier heads are noted for their *superior quality.* They offer a new double cone cork faced friction clutch for positive "controlled" driving with finger tip pressure; soft cushioned driving action, ball bearings for smoother, faster operation; heat treated gears; and special balanced reversing mechanism; plus many others. It all adds up to *more* production, *better* production, for *longer* periods, for *less.*

Write for FREE Brochure

giving full details and specifications on the Procunier line of tapping heads.

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PRECISION DIAL CALIPER

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6"
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Full scale reading of 5" — 6" — 8" — 10" Available. Also Foot with Scriber to convert to Vernier Height Gage.

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PRESSES UP TO 450-TON, 48" x 48", TRIPLE ACTION
PLANERS UP TO 20-FOOT STROKE, 72" x 72"
RADIAL DRILL PRESSES UP TO 8-FOOT, 19" COLUMN
LATHES UP TO 158" c.c., 57½" gap, 40" SWING
BORING MILLS UP TO 120" BED, 90" HORIZ., 60" VERT.

Also Milling Machines, Grinders, etc. Complete production facilities — experienced machinists.

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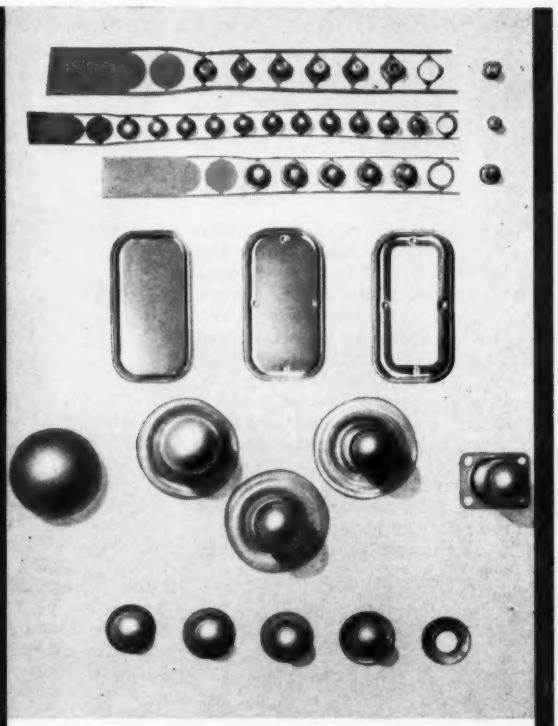


These multi-staged progressions were formed on machines capable of both automatic and manual stamping. Progressions such as these are just one of several Whitehead stamping specialties.

To you who need service and dependability when you buy stampings, washers and specialties

Service and dependability are often *the* important considerations when you want stampings — no question about it! And they become all-important when you're in one of those tough spots — needing fast delivery of an exacting job without "impossible" cost.

When you have a stamping job — routine or special — expect service and dependability from your stamping source. It has been the basis for confidence among Whitehead customers for more than half-a-century.

Besides stamping, drawing, and forming, we also have facilities for assembly including drilling, riveting, spot welding, machining, as well as complete equipment for die making.

Send your prints or samples for Whitehead estimates. Also — take advantage of the substantial savings that result from your use of Whitehead stock dies . . . CATALOG ON REQUEST.

WHITEHEAD EST. 1903

WHITEHEAD STAMPING CO.
1677 W. Lafayette • Detroit 16, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 2694

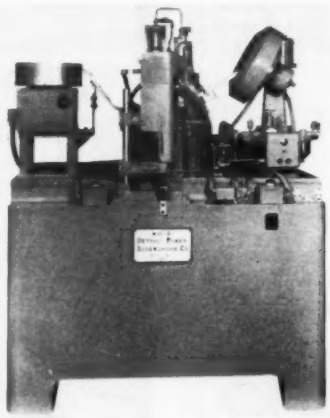
Special Machine Assembles Rolling Hangers

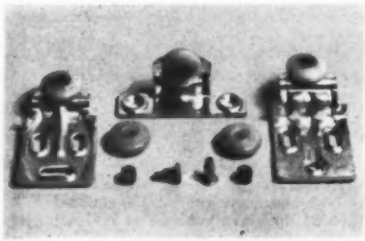
A new machine has been built to assemble semi-automatically the rolling hangers for sliding doors and sliding screens.

There are three different styles of hangers, each assembly consisting of bracket, shoulder rivet, bronze bushing and nylon roller.

Three feeding devices, two shown in the illustration of the machine and one hidden, feed the three components: the shoulder rivet, bronze bushing and the nylon roller. The three components are pre-assembled as follows: (1) the nylon roller is fed from a vibratory feeder into an indexing dial; (2) the bronze bushing or bearing is fed from another vibratory feeder and pressed into the nylon roller; (3) at the next index the shoulder rivet is fed by means of a barrel or rotary feeder and inserted into the roller and bushing.

The completed assembly is then





ejected into a track twisted 180°, which feeds the completed three-part sub-assembly into a locating fixture. The operator then simply places the steel bracket over locating pins in the fixture and touches two palm switches which, in turn, cycles the pneumatic-operated impact hammer. At the point of the assembly, the hollow body of the shoulder rivet is flared, completing an integral assembly.

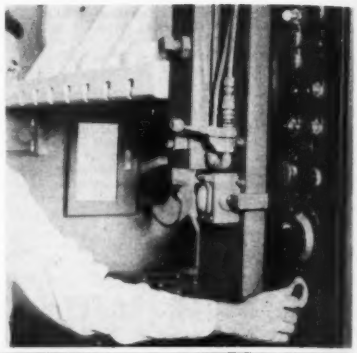
The machine was developed by The Detroit Power Screwdriver Company, 2801 West Fort St., Detroit 16.

Light Intensity Fully Controlled by Press Operator

A switch on the control panel enables the press operator to vary die light intensity from "bright" to "off" with Clearing Machine Corporation's newly designed die light. Thus, the operator can select the exact amount of light needed in each operation of the press and under varying shop conditions.

The die lights are built into the press upright and have a frosted glass covering.

Press operator controls the die light from a control panel switch on the press upright.



NUMBERALL
CUTS THE COST OF STAMPING NUMBERS

MODEL NO. 40B

Numbering and Lettering press Mono Wheel Automatic Spacer

Designed for the purpose of impressing Letters and Numbers in all kinds of Name Plates and Flat Metal Parts. The Dials 3¾" Diameter are made of Special High Grade Tool Steel, scientifically hardened and tempered. The Characters are carefully engraved and make clear cut impressions of uniform depth. Standard Dials are engraved with 40 characters. Character Heights as follows: 1/16, 3/32, 1/8, 5/32, 3/16". Different size Dials are interchangeable. Carriage Table advances one space with each impression of the Dial, like a typewriter, doing rapid work, even spacing and perfect alignment. Plates up to 5" wide and 6" long can be stamped, but can furnish a longer Table and Rack if required. Depth of impressions is adjustable by a screw on bottom of machine. A direct sight gauge is provided to facilitate stamping in the proper place.

Specialists in making devices for stamping details into Nameplates, such as Automatic and Non-Automatic Numbering Machines, Type and Type Holders, and Chases, etc.; also Presses.

MODEL No. 40B

Bulletin TP-40B on request.

NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 2701

HEAVY-DUTY AIR (or Oil) CLAMPS

Never send a boy TO DO A MAN'S JOB

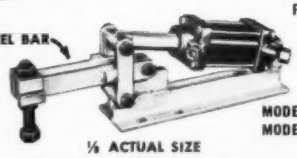
Design with clamps rated to the job they must do. Knu-vise heavy-duty clamps possess the extra margin of life needed because they're rugged, strong, built to stand abuse.

Knu-vise heavy-duty clamps are air (or oil) and hand operated —have either solid or channel bars. Featured are:

1. Hardened and ground bearing bolts
2. Self-locking nuts for minute adjustment of parts
3. Toggle bars from C.R.S. bars
4. Easy and complete replaceability of parts

SOLID BAR

CHANNEL BAR



Pictured are just two of several heavy-duty models available.

MODEL AO-400 (HD)—CHANNEL BAR
MODEL AOS-400 (HD)—SOLID BAR

½ ACTUAL SIZE

In a high production automobile plant, a Lapeer installation lasted for more than 1,300,000 cycles. After a small repair, the installation had passed the 2,000,000 mark and is still going strong. Better write today for complete information. No obligation, of course.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

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3064 DAVISON ROAD • LAPEER, MICHIGAN
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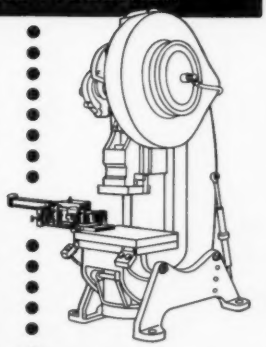
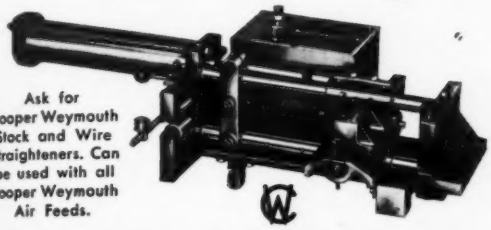
CIRCLE INFORM-A-GRAM KEY NO. 2702

COOPER WEYMOUTH
AIR OPERATED SLIDE FEEDS
Boost Power Press Production

Specifically designed to solve the automatic feeding problems in press rooms. Simplified, open throat construction. Air operated from standard shop lines. Easily set up and adjusted at the front, rear or sides of press for accurate long or short runs. Cooper Weymouth Air Feeds, made in five sizes, will feed lengths up to 36", of stock up to 18" in width. They are readily adaptable to material of irregular cross section and ideal for use with hydraulic presses.





Ask for Cooper Weymouth Stock and Wire Straighteners. Can be used with all Cooper Weymouth Air Feeds.

SEND FOR INFORMATION ON THESE AND OTHER PRODUCTS

COOPER WEYMOUTH, INC.
600 HONEYSPOT ROAD, STRATFORD, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 2711

FREE BOOKLET

. . . tells how diamond abrasive assures better metallographic specimens.

ELGIN DIAMOND
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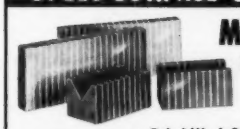

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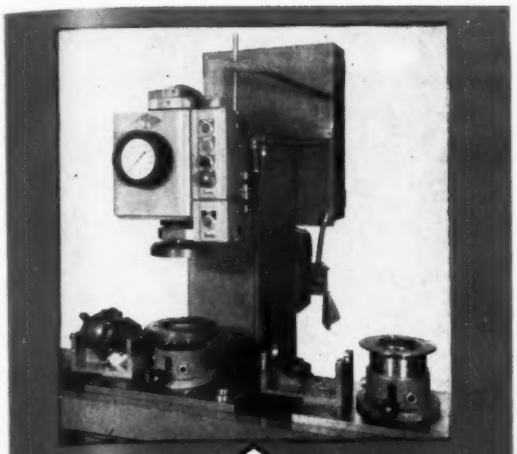

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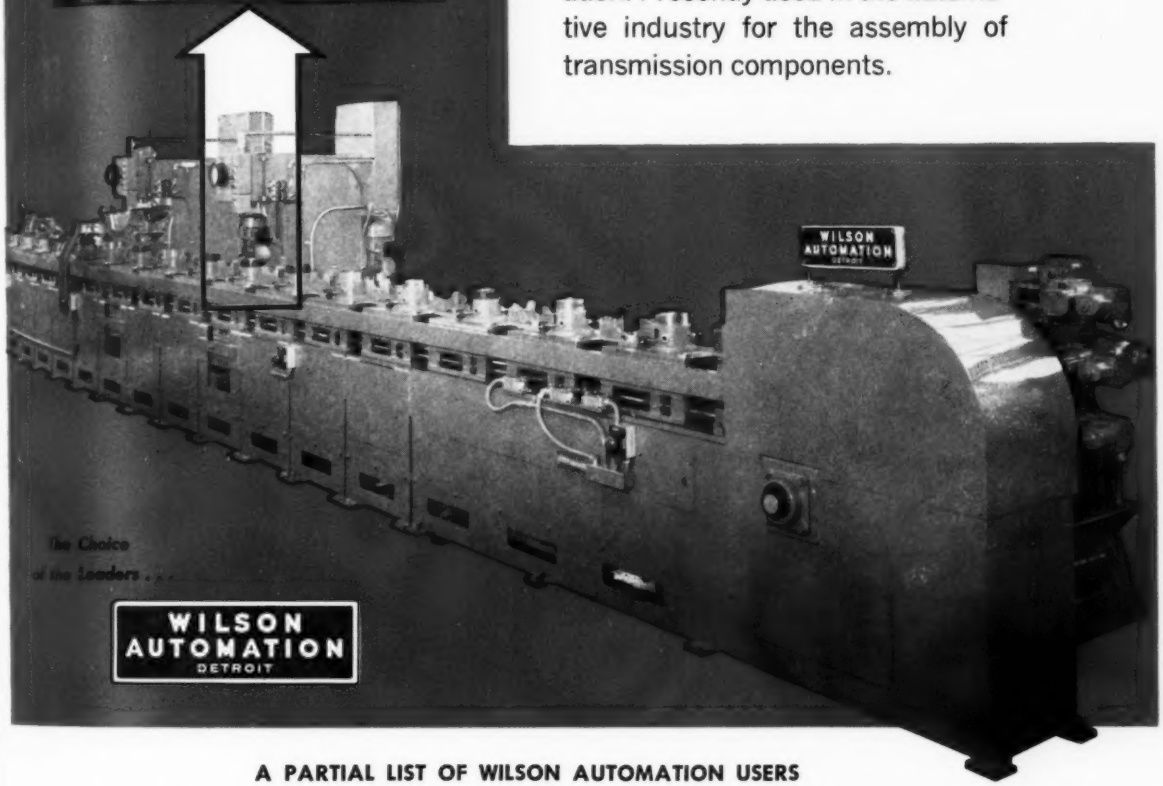

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